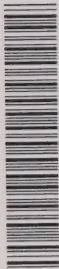


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ROYAL COMMISSION OF INQUIRY INTO CERTAIN
DEATHS AT THE HOSPITAL FOR SICK CHILDREN AND
RELATED MATTERS.

Hearing held
8th floor
180 Dundas Street West
Toronto, Ontario

KAUFFMAN
X Skating
Scott.

The Honourable Mr. Justice S.G.M. Grange

P.S.A. Lamek, Q.C.

E.A. Cronk

Thomas Millar

Commissioner

Counsel

Associate Counsel

Administrator

Transcript of evidence
for

December 1, 1983

VOLUME 73

OFFICIAL COURT REPORTERS

Angus, Stonehouse & Co. Ltd.,
14 Carlton Street, 7th Floor,
Toronto, Ontario M5B 1J2

595-1065





ROYAL COMMISSION OF INQUIRY INTO CERTAIN
DEATHS AT THE HOSPITAL FOR SICK CHILDREN
AND RELATED MATTERS.

Hearing held on the 8th Floor,
180 Dundas Street West, Toronto,
Ontario, on Thursday, the 1st
day of December, 1983.

- - - -

THE HONOURABLE MR. JUSTICE S.G.M. GRANGE - Commissioner
THOMAS MILLAR - Administrator
MURRAY R. ELLIOT - Registrar

- - - -

APPEARANCES:

P.S.A. LAMEK, Q.C.) Commission Counsel
E. CRONK)

D. HUNT) Counsel for the Attorney
L. CECCHETTO) General and Solicitor General
of Ontario (Crown Attorneys
and Coroner's Office)

I.G. SCOTT, Q.C.) Counsel for The Hospital for
M. THOMSON) Sick Children
R. BATTY)

D. YOUNG Counsel for The Metropolitan
Toronto Police

W.N. ORTVED Counsel for numerous Doctors
at The Hospital for Sick
Children

B. SYMES Counsel for the Registered
Nurses' Association of Ontario
and 35 Registered Nurses at
The Hospital for Sick Children

(Cont'd)



APPEARANCES (Continued):

D. BROWN Counsel for Susan Nelles -
Nurse

G.R. STRATHY) Counsel for Phyllis Trayner -
E. FORSTER) Nurse

J.A. OLAH Counsel for Janel Brownless -
R.N.A.

B. JACKMAN Counsel for Mrs. M. Christie -
R.N.A.

S. LABOW Counsel for Mr. & Mrs. Gosselin,
Mr. & Mrs. Gionas, Mr. & Mrs.
Inwood, Mr. & Mrs. Turner, Mr.
Mrs. Lutes, and Mr. & Mrs.
Murphy (parents of deceased
children)

F.J. SHANAHAN Counsel for Mr. & Mrs. Dominic
Lombardo (parents of deceased
child Stephanie Lombardo); and
Heather Dawson (mother of
deceased child Amber Dawson)

W.W. TOBIAS Counsel for Mr. & Mrs. Hines
(parents of deceased child
Jordan Hines)

J. SHINEHOFT Counsel for Lorie Pacsai and
Kevin Garnet (parents of deceased
child Kevin Pacsai).



I N D E X O F W I T N E S S E S

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I N D E X O F E X H I B I T S

<u>NO.</u>	<u>Description</u>	<u>PAGE NO.</u>
275	Copy of Dr. Kauffman's handwritten notes re Rating No. 1.	5988



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EMT/cr

1 ---On commencing at 9:30 a.m.

2 THE COMMISSIONER: Miss Cronk?

3 MS. CRONK: Good morning, sir.

4 I now have a typewritten version of the breakdown
5 of Dr. Kauffman's probability rating No. 1 scores,
6 his handwritten notes.

7 THE COMMISSIONER: What will we call
8 this? "A breakdown of Rating No. 1".

9 MS. CRONK: Thank you, sir.

10 THE COMMISSIONER: No. 275.

11 ---EXHIBIT NO. 275: Copy of Dr. Kauffman's hand-
12 written notes re Rating No. 1.

13 THE COMMISSIONER: Yes, Mr. Strathy.

14 MR. OLAH: Excuse me, sir, what is
15 the number?

16 THE COMMISSIONER: Exhibit 275.

17 DR. RALPH KAUFFMAN, Resumed

18 CROSS-EXAMINATION BY MR. STRATHY:

19 Q. Doctor, just before we begin
20 you mentioned yesterday I believe that you had at
21 the request of the Crown Attorneys reviewed the
22 charts of the children that are under consideration;
23 some 30 odd charts.

24 Do I understand you to say that that
25 process took approximately a day?

A. It was approximately a day,



1

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yes.

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Q. So it was done in the course
of one particular day?

5

A. Yes.

6

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Q. And that was the only
opportunity you had to review these charts?

8

A. The complete chart, yes.

9

Q. And are we talking about 30
or 35 charts?

10

A. 37.

11

Q. 37.

12

A. To my recollection.

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Q. Now, Doctor, I have read your
evidence at the Gary Murphy Inquest, and Miss Cronk
referred to it yesterday. I understood you to say
at that inquest as you have said in fact today and
it is clear in your report even though digoxin as
a drug has been around for many years there is still
a great deal that we do not know about it.

19

Is that a fair statement of your
belief?

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A. I think I would agree with that,
yes.

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Q. And that it is really only in
recent years that physicians and pharmacologists are



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beginning to understand how the drug actually operates in the body?

A. I think the knowledge has expanded a great deal in recent years and there is still a great deal to learn.

Q. Particularly I suppose with the development of radioimmunoassay in the 1970s your knowledge has expanded due to that fact?

A. That is correct. That was a contributor.

Q. And is assisting physicians and pharmacologists in their understanding of the drug?

A. That is correct.

Q. But you have also expressed a number of areas where it is clear that our knowledge is at best incomplete. For example, the distribution of the drug in the various tissues of the body?

A. There is a lot of uncertainty there and a lot that we don't know yet.

Q. And also clearly in the measurement of digoxin in tissues and serum post mortem?

A. I would agree with that.



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Q. And indeed in the area particularly of tissues and the half life of drug in the tissues; again it is an area we don't know too much about?

A. Just starting to get some information on that very recently.

Q. And when we are talking about post mortem life in tissue again as you have explained that is another area where our knowledge is just beginning to develop?

A. That is incomplete.

Q. Now, Doctor, dealing with the symptoms of digoxin toxicity I take it you would agree that the symptomatic signs of digoxin in infants are non-specific?

A. I would agree with that in general, yes.

Q. And indeed that there are symptoms that can be due to other factors including the clinical condition of the child?

A. They can in many cases, yes.

Q. So in a clinical condition it may be difficult to know whether a specific symptom is due to digoxin toxicity or not?

A. That is correct.



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Q. And I would like to put to you, Doctor, a statement of Dr. Hastreiter and I believe you met Dr. Hastreiter when you were working on the police team?

A. That is correct.

Q. And the statement comes from Dr. Hastreiter's report which is Exhibit 264, page number 27.

Dr. Hastreiter says this, and if you would listen to the quotation ---

A. I am sorry, which report are you referring to?

Q. Dr. Hastreiter has given us or his counsel has given us a big report of Dr. Hastreiters. Have you read this report or have you ever seen it before?

A. Is that the one you showed me - is that the case summaries?

Q. Case summaries, yes.

A. Yes, yes.

Q. Well, included in this volume, and you needn't dig it out I will try and read it slowly.

A. Okay.

Q. At page 27 Dr. Hastreiter was



1
2 answering certain questions put to him by Sergeant
3 Warr and he says this:

4 "In my opinion the only true proof
5 of digoxin toxicity is the demonstration
6 of high concentration of the drug in
7 blood or tissue. Digoxin intoxication
8 can mimic many other conditions and
9 particularly in infants who are
10 seriously and acutely ill from other
11 causes, the differential diagnosis can
12 be extremely difficult."

13 There are really two statements there,
14 but are you able to adopt that as a reflection of
15 your views?

16 A. There may be even more than
17 two statements there.

18 Q. Do you want me to break it
19 down?

20 A. I probably should look at
21 it because I don't know if I would agree with it
22 ~~en~~ toto as stated. I really don't know.

23 Q. All right. Let's break it
24 down.

25 MR. YOUNG: I think, Mr. Commissioner,
for other counsel and for the witness this is



1

2

Exhibit 264 I believe.

3

THE COMMISSIONER: Yes.

4

MR. STRATHY: I thought I said that.

5

MR. YOUNG: Oh, you may have, Mr.

6

Strathy.

7

THE COMMISSIONER: The only copy we
have here I have appropriated to myself.

8

MR. YOUNG: I have another copy if

9

that will assist.

10

MR. STRATHY: Well, I will read it out

11

loud slowly.

12

Q. So, Doctor, it starts:

13

"In my opinion the only true proof
of digoxin toxicity is a demonstration
of high concentration of the drug in
blood or tissue."

14

15

16

Now stopping there is that a statement that you
are prepared to adopt?

17

18

A. I am not willing to adopt

19

that statement as it is stated. I think that even
high concentrations in blood or serum, ignoring
tissue for the moment, may or may not indicate
digoxin toxicity.

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21

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Tissue, depending on what you mean

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by "high concentration" possibly. The statement

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2 "true proof" I can't totally agree with because I
3 think that you can't prove digoxin toxicity with
4 any single piece of information. I think you have
5 to put the composite together of clinical symptoms
6 and signs, electrocardiographic evidence, possibly
7 clinical chemistry evidence and digoxin concentration
8 evidence.

8 Q. So ---

9 A. I think it is dangerous to
10 say that any one of those is the only true proof.

11 Q. So in and of itself then high
12 levels or high concentrations in blood, let us say,
13 may not necessarily be a sign of digoxin toxicity.

14 A. Depending on what you mean
15 by "high". It is very dependent on the time after
16 the dose is administered that you obtain the
17 concentration, the sample for the concentration
18 measurement as we pointed out.

19 Q. And I take it, Doctor, from
20 what you said as far as the first sentence is
21 concerned you would not go as far as Dr. Hastreiter
22 has perhaps on the face of it and you would suggest
23 that simply looking at a high concentration on its
24 own may not be enough to show digoxin toxicity?

25 A. Yes, I think that is the point



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I am making.

Q. All right. I think you would agree, however, with the second paragraph, the second sentence?

A. Yes, I ---

Q. That:

"Digoxin intoxication can mimic many other conditions and particularly in infants who are seriously and acutely ill from other causes, the differential diagnosis can be extremely difficult."

A. Yes, I would agree with that.

Q. So that when we are looking at a particular digoxin level and also looking at symptoms in the child we have to be aware that those symptoms can reflect other conditions including the child's underlying disease?

A. Yes, that is correct.

Q. Doctor, we have heard that there was a conference on digoxin here in Toronto in the past month. Were you present at the conference?

A. Yes, I participated in that conference.

Q. And at that conference were



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a number of the uncertainties about digoxin that you referred to here today, were those discussed at the conference?

A. Among the discussions, those were certainly part of the discussion, yes.

Q. Now, Doctor, dealing again with your evidence at the Murphy Inquest you discussed this subject yesterday, and you pointed out that your hypothesis No. 5 which you ultimately felt was the most likely if I could put it no higher than that; you indicated even with the hypothesis No. 1 you had some difficulties?

A. I was uncomfortable with it, yes, but it was the best of the things I could think of to help shed some light on that situation.

Q. And what was it about hypothesis No. 5 that made you uncomfortable?

A. Well, I think that among the things that bothered me was that we didn't have much information on the blood gas situation or the electrolyte situation or the renal function situation of Gary Murphy shortly before he died.

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3 It was clear from the chart that he
4 was progressively deteriorating and becoming rapidly
5 much sicker but there wasn't much information, as I
6 recall, right around the time of his death and shortly
7 before because people had made the decision that he
8 couldn't be cured, he couldn't be kept alive
9 indefinitely and that the most humane thing was to
10 keep him comfortable and love him and let him die
11 whenever that time came.

12
13 So, a lot of medical intervention was
14 not taking place. So, we had a ^{paucity} ~~posity~~ of concrete
15 information upon which to base a hypothesis, including
16 digoxin concentration.

17
18 The other thing that bothered me was
19 that my hypothesis was I thought a very theoretical
20 hypothesis and as I stated I think in my testimony
21 at that time, I really didn't have any hard objective
22 scientific evidence that indeed this kind of thing
23 could occur. I was basing it on indirect evidence
24 from a general knowledge of how digoxin distributed in
25 the body and my understanding of digoxin binding to
tissues and to specific receptors and what things
might possibly affect that binding.

Q Well then, on that point,
Doctor, your fifth hypothesis, is it fair to



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characterize that as it has been characterized as an
abnormal pathophysiology?

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A. I based it on the fact that
there was abnormal anatomical and - let me say it
this way. There were anatomical, severe anatomical
and physiological abnormalities in that patient
during his life and leading up to the time of his
death and that was a part of the basis for my
hypothesis.

10

11

12

Q. I'm just trying to establish
a phrase that we can use in understanding ourselves.
Is that a fair description, abnormal physiology?

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A. Right, I think so.
Q. You mentioned that in your
view it was a theoretical explanation for the death.
Had you, prior to your participation in the Gary Murphy
inquest in May of 1983, ever seen any references in
the literature to abnormal pathophysiology with
respect to digoxin?

19

20

21

A. I can't say at the moment that
I hadn't. I can't consciously think at this moment
of a specific reference. That is a commonly used
cocept.

22

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Q. In relation to drugs?

A. In relation to medicine in
general.



B.3

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Q All right.

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A And I can't say definitely

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that I had never considered that concept in relation

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to digoxin prior to this. In fact, if I had not

6

consciously thought about it previously I probably

7

would not have arrived at that particular hypothesis.

8

Q Well, let me put it this way.

9

Can you refer us today to any reported cases in the

10

literature of abnormal pathophysiology with respect

to digoxin?

11

A As I stated at that time I

12

wasn't aware of this kind of thing being documented

previously.

13

Q Well, perhaps if you do become

14

aware of it being documented previously, even after

15

you have given your evidence today or tomorrow you

16

might refer it to Miss Cronk.

17

A Okay.

18

Q Doctor, with respect to this

19

whole abnormal pathophysiology aspect of digoxin, I

20

think you would probably agree that if it is an

21

explanation for the Gary Murphy case it may well be

22

another area where our knowledge about digoxin is

fairly embrionic.

23

A I think our knowledge is

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very minimal in that area in terms of concrete
information.

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Q Because surely if there is
something such as abnormal pathophysiology which
creates an effect such as you posited it may have in
Gary Murphy, it is entirely possible it may in other
circumstances create the same effect in other children?

A. It could under similar
circumstances.

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Q And the parameters of those
similar circumstances we really don't know?

A. No. We can, at least, I
limited those parameters based on the factors I thought
could do such a thing. But the experiments to my
knowledge have not been done.

15

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Q Doctor, at your digoxin
conference, or the digoxin conference in Toronto in
the past month, was this question of endogenous
digoxinlike substance discussed?

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A. Yes, it was.

Q Was Dr. Seccombe from Vancouver
present at that time?

(2) 24

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A. No, I don't believe he was. The
individual who led the discussion on that was from
St. Louis.



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Q And did that focus upon the relatively recent discovery of an endogenous digoxin-like substance?

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A I can't really comment on that because that was a separate workshop. I was chairing a different workshop, and, so, I couldn't attend that one and so I don't know what the - and I haven't seen a transcript of the workshop so, I can't really comment on what that discussion was. I am aware of the general topic but I don't know what the discussion was at that workshop.

12

13

14

Q Can you tell us when you first became aware of this endogenous digoxinlike substance or the theory that there was such a substance?

15

16

A Some time during this past year.

Q And was it prior to your participation on the police team?

17

18

19

A It was subsequent to that.

20

Q Was it subsequent to the preparation of your various reports, your individual case summaries?

21

22

A Yes, that is correct, it was subsequent to the preparation of that report, including the January letter.

23

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Q I take it you yourself have



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not done any particular research in this field, any
research in that field?

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A. That is correct.

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Q. Now, is your knowledge of this
substance sufficient to let you know whether or not
it is something which appears in tissues?

7

8

A. I'm not aware of any information
right now that tells us whether or not this substance
is a problem in tissue assays.

9

10

11

Q. That's not to say there may
not be information to that effect.

12

13

14

A. I have seen no published
information about that or heard any papers presented
at meetings during the past year or two specifically
regarding that.

15

16

17

Q. Well, just to assist you, there
has been evidence before the Commission from
Dr. Seccombe. Do you know Dr. Seccombe?

18

19

A. I don't know him. I know who
he is from this work that he did but I don't know him.

20

21

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Q. There has been evidence of
Dr. Seccombe before the Commission that this Substance
X and, in fairness to you, he was a little discreet
about where his research is going for reasons which
I think you can understand. But he did suggest that



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their preliminary studies had suggested that Substance X may in fact appear in tissues. I gather you are not aware of that however?

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A. No. I don't know either way, really can't comment on it.

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Q. Now, let us posit this situation. If Substance X is in fact an endogenous digoxinlike substance which is in effect manufactured in the body and in fact will be manufactured in the body even of people or children who are not receiving digoxin and if in fact it does appear in the tissues, that may explain in the particular case the presence of something that looks like digoxin in post mortem tissues of a particular infant?

15

16

A. If it was there in adequate quantities and interacting with the antibody it could I think.

17

18

19

Q. Thank you, Doctor. I want to deal now with some of the specific children that you have given evidence about.

20

21

Firstly, I want to ask you to refer to the case of Jordan Hines.

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A. Okay. Let me get a copy of the chart, please.

Q. Can we have a copy of the chart, please?



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THE COMMISSIONER: Yes. Perhaps if you would let us know which ones you are going to do so the Registrar can get them.

MR. STRATHY: I don't know that we are going to need many of the charts but the Hines chart is Exhibit 103.

Just for your reference, Mr. Commissioner, and the witness, the children I propose to deal with are Hines, Cook, Belanger, Lombardo, Miller, Pacsai, Inwood.

Q Dealing with Hines, Doctor, you made reference to the digoxin levels in the child and those levels are found in Mr. Cimbura's report at page 6 and somewhat later in the report as well, but you are aware I think that all these levels in the case of Hines are levels from exhumed specimens?

A. Yes, that is correct.

MS. CRONK: I'm sorry, Mr. Strathy, but there are of course fixed tissue specimens against Jordan Hines.

THE WITNESS: I guess that is not correct. You say it is on page 6 of Mr. Cimbura's report?

MR. STRATHY: Q Yes, that's right. Page 6 is the fixed tissue, excuse me.

Shetty knows, from Grubbs's ev.

that when a concentration is
reported as "dioxin" it means

the level was determined by

RIA-HPLC-RIA !



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A. I'm sorry, I have different numbers.

Q. Well, we are talking about different reports.

A. Oh, okay.

Q. Yes, you are right. Now sample T60 tissue and fluid from the heart 118 nanograms per gram of digoxin and digoxinlike substances, concentration of digoxin 52 nanograms per gram. Right atrium 45 nanograms per gram of digoxin and digoxinlike substances. Septum 174 nanograms per gram of digoxin and digoxinlike substances, 89 nanograms per gram of digoxin. And then tissue in jar, liver after exhumation 240 nanograms per gram. Then in a later report, doctor, and I don't know that you need to go to it, there is reference to muscle from the right thigh after exhumation 56 nanograms per gram.

A. And that included both digoxin and digoxinlike substances?

#2 !
Q. It says nanograms per gram of digoxin, it doesn't, there is no information --

A. It doesn't make a differential?

Q. That is right. Then a subsequent report talks about heart reported to be a mixture of tissue and Ely medium 9 nanograms per



C2

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2 millilitre of digoxin. A subsequent one lung a mix-
3 ture of tissue and Ely medium 10 nanograms per milli-
4 litre of digoxin.

#3 !
5 Now in all of these things where we
6 have a mixture of digoxin and digoxinlike substances,
7 we are seeing presumably under radioimmunoassay
8 breakdown products, or some of the breakdown products
9 of digoxin.

10 A. It was my understanding from
11 talking to Mr. Cimbura and looking at his laboratory
12 that what he did was run -- assay the samples with the
13 radioimmunoassay without doing any separation and then
14 ran the extract of the sample through high pressure
15 liquid chromatography and collected the appropriate
16 fraction and did the radioimmunoassay again on that
17 fraction, attempting to separate the true digoxin
18 from things that might bind to the antibody but were
19 not digoxin. My concept was at that time that these
20 could be comprised of either breakdown products of
21 digoxin which was originally there, or possibly
22 endogenous substances which will be separated from
23 true digoxin in the HPLC process.

24 Q. So that at least in the first
25 measurement before the HPLC when you measured the
substance you are getting some of these metabolites of



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digoxin.

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A. Metabolites or other interfering substances.

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Q. But as I understand it with HPLC you are only going to screen out those metabolites or endogenous substances that you know about and which you are able to take a sample on?

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A. I am not sure that is totally true. You should be able to separate digoxin itself on the HPLC from other substances that do not co-migrate with it on the column, and you may not be aware of what all those other substances are.

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Q. So if there are other substances that co-migrate with digoxin on the column you are not aware of that, you may not in fact separate them out with HPLC?

17

18

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A. You may not and then it could be subject to an error which would only occur if they co-migrate on that particular HPLC system and also interact to some degree with the antibody.

20

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Q. And if we are positing an endogenous digoxinlike substance that we as yet may not know very much at all about, it is entirely possible that that substance may be of the kind that co-migrates on the column, and because you don't know



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that --

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A. You can't run controls to see
if the separation is separating it.

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Q. Precisely. Now, doctor, on
the subject of Hines, Baby Hines, I haven't gone
through your curriculum vitae in any detail, but I
don't recall that you have any training as a patholo-
gist, am I right in that?

9

10

11

A. No, I am not a pathologist.

Q. Nor do you have cardiology

training?

12

A. That is correct.

13

14

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Q. In reviewing this particular
chart, may we take it that in view of the time
constraints placed on you you really did not have
more than half an hour to go through Baby Hines'
chart?

17

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A. That is not totally true, because
I didn't divide my time equally with each chart and
there were some charts I spent several hours with.

20

21

Q. Do you have a recollection of
how long you spent with this chart?

22

23

24

25

A. No, I don't, no, but I'm sure
it is one of the ones I spent more time with.

Q. I was interested in your



C5

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comment, doctor, that you didn't consider SIDS as a
reasonable possibility in the case of this child, am
I doing justice to you?

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A. I think that is a fair summary
of my comments the other day.

7

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10

Q. Well, I was interested in that
comment because you said that one of the factors that
influenced you in coming to that conclusion was that
there was nothing in the history of the child which
would point you to SIDS, do you recall saying that?

11

12

A. No, I don't think that is what
I said.

13

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16

Q. What do you recall?

A. I think - and I would like to
look at my testimony. What I think I said was that
there were other factors in the history that led me
to believe it was not SIDS.

17

18

Q. My recollection was that it was
a broader statement than that.

19

20

A. I would have to refer to my
testimony.

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Q. I don't think we need to go
into it in that detail.

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A. There is a difference and that
is the only reason I disagreed with you just now.



C6

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Q. I want to refer you to the history of the child, and in particular to page 28 of the chart, this is a summary of the history, do you have that?

A. Yes, I do.

Q. It is in the preliminary autopsy report, and it starts on the third line:

"The infant was well until one day prior to admission, when he was found by his mother in bed, grey-blue, with shallow breathing. She picked him up and shook him. The child then choked and cried. There were a few more episodes of shallow respirations followed by slate grey-blue discoloration. Each of these responded to shaking. The baby had not been active or feeding well for a few days prior to this. There was no fever. He was admitted to North York General Hospital where he was found to have spells of apnea, associated with bradycardia followed by tachycardia."

Now, doctor, just going back to that



C7

1
2 initial episode when:

3 "...the child was found by his
4 mother in bed grey-blue with shallow
5 breathing. She picked him up and
6 shook him. The child then choked
7 and cried..."

8 Is that in your view consistent with
9 a missed-SIDS episode?

10 A. It can be consistent with a
11 lot of things and that would be one of them. It could
12 be consistent, what I thought when I initially looked
13 at this chart was that this baby had sepsis and then
14 when the cultures were finally reported they were
15 negative. As I said the other day that doesn't totally
16 rule out sepsis but it makes it less likely. It could
17 also be due to an upper respiratory infection in a
18 baby this age. It could be due to an arrhythmia of
19 some sort. It could be due to a seizure. With this
20 kind of information it could be due to a number of
21 things.

22 Q. All right. Certainly one of
23 those things that we can point to would be a missed-
24 SIDS episode?

25 A. At that point with that kind of
information among the differential diagnoses I think



1
C8 2 SIDS is a reasonable one, yes.

3 Q. And then the subsequent
4 admissions at North York General Hospital when the
5 child was found to have spells of apnea, and would
6 that also be consistent with the missed-SIDS episode?

7 A. If that was the only thing
8 that was going on that could be consistent with a
9 baby who had had a close call with SIDS, yes.

10 Q. And as I understand it children
11 who have had one missed-SIDS are particularly sus-
12 ceptible to subsequent SIDS episodes?

13 A. Well, I think we get into a
14 grey area here. One thing I want to point out is
15 I think it is important to conceptually not make
16 apnea equivalent to SIDS or missed-SIDS. Apnea can
17 be caused in a baby this age by a large number of
18 pediologic factors. Whatever SIDS is can be
19 associated with apnea, or apnea can be a forerunner
20 of a baby that eventually dies from SIDS.

21 On the floor of the hospital where I
22 attend we see enormous numbers of babies admitted
23 with histories of apnea. We have one room that is
24 devoted totally to doing nothing but pneumograms on
25 babies who are suspected or known to have apnea, and
obviously most of those babies are not missed-SIDS.



C9 1
2 So I think it is important conceptually not to equate
3 the two.

4 Q. Yes. Doctor, the preliminary
5 autopsy is signed by Dr. Becker; do you know anything
6 about Dr. Becker or his qualifications?

7 A. I don't know. I know he is an
8 eminent pathologist I don't know him personally at all.

9 Q. Presumably you are not aware
10 that he has given presentations at various conferences
11 with respect to SIDS?

12 A. I am aware that he has done
13 a great deal of research on SIDS, I have never heard
14 any of his presentations.

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Q. In his Curriculum Vitae which is Exhibit 192 it notes he gave a presentation on Sudden Infant Death Syndrome at the International SIDS Conference in Baltimore in 1982.

Were you present at that conference?

A. No, I was not.

Q. And he has done other writings including chapters in books on SIDS, articles on SIDS. Have you done any writing on SIDS?

A. No, I have not.

Q. Are you aware of Dr. Bain?

A. I know who he is and I met him for the first time last month when I was at the digoxin workshop here. I had read his report a year ago.

Q. Are you aware of Dr. Bain's qualifications in the field of cardiology?

A. I am aware that he is an eminent cardiologist. I don't know specifically his CV.

Q. Well, let me refer you to Dr. Bain's report which is Exhibit 148 that you indicated you have read.

A. I haven't read it in the past year.

#4 !

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Why doesn't Shatky apologise for
his misleading statement?



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Q. No, no. Do you have it with you?

3

4

A. I am not sure I have it here. It probably would be best if there was a copy that I could refer to.

5

6

✓

7

MR. SCOTT: Just so that it will be clear, I don't want to confuse the expertise of Dr. Bain but he is not a cardiologist at all. I think that should be made clear for the record.

8

9

10

THE COMMISSIONER: All right.

11

12

MR. SCOTT: I accept it on his behalf that he is eminent but I cannot accept Dr. Kauffman's statement that he is an eminent cardiologist.

13

14

THE WITNESS: I will withdraw that statement.

15

16

MR. SCOTT: Leave the eminent part in. I will have to report to him.

17

18

MR. STRATHY: Q. Doctor, if you would turn to page 17. It is not particularly well numbered.

19

20

A. Of the Bain Report?

21

Q. Bain Report.

22

THE COMMISSIONER: That is the page between 16 and 18 surprisingly. Sometimes you find in this report that that doesn't hold true. In

23

24

25



Kauffman, cr.ex.
(Strathy)

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2

this case it does.

3

MR. STRATHY: Q. Do you have that,
Doctor?

4

5

A. Yes, I do.

6

Q. At the top of the page
Dr. Bain is summarizing the case of Hines and he
says:

7

8

"The episodes described at home prior
to this baby's admission to the North
York General Hospital are consistent
in every way with near missed Sudden
Infant Death Syndrome."

9

10

11

12

13

Now do you agree or disagree with that
statement that they are consistent in every way?

14

15

A. I would not totally agree with
that as I read the chart.

16

17

Q. For the reasons that you have
given?

18

19

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A. Yes, because the baby
apparently was not well and was not feeding well
for several days before this episode occurred which
indicated he was sick for some reason and then he
did have the apnea. But as I said I think if he
would have had the apnea without the other things
occurring before and subsequent to his admission



1
2 I could accept a near missed-SIDS I think fairly
3 readily, but these other things make me less ready
4 to accept as strong a statement as this.

5 Q. What about the next statement:

6 "Such babies are at extremely high
7 risk of dying in the weeks following
8 such an episode."

9 Are you prepared to accept that?

10 A. I think a baby who has apnea,
11 documented apnea, is at increased risk, yes.

12 Q. What about babies who have
13 had a near missed-SIDS. Are they at an extremely
14 high risk of dying?

15 A. I would think they are at an
16 increased risk, yes.

17 Q. And he says:

18 "The mode of dying in Hospital was
19 again completely consistent with SIDS."

20 Do you accept that statement?

21 A. I don't totally accept that,
22 no.

23 Q. What is your reservation?

24 A. My reservation again is that
25 this was a baby who had other symptoms and findings
before he came in, several days before he came into



1

2

the Hospital. He continued to have some arrhythmias ---

3

Q. Well, just before you go on ---

4

A. I am sorry.

5

6

Q. He is talking about the mode of dying in the Hospital. I am simply asking if the mode of dying is consistent?

7

8

A. Well, let me refer to the description if I may of his mode of dying.

9

10

11

I get the details of the cases confused and so I really should review the description before I answer you definitively.

12

Q. All right.

13

A. If you can refer me to the appropriate pages?

14

Q. Yes.

15

16

17

A. I remember when I read it I didn't think that it was but I can't give you specific answers without referring to it.

18

19

Q. Well, if you look at page 36, you have got the arrest note, and before that, the page before you have got the nurse's note.

20

21

A. If we can go back a couple of pages before that.

22

Q. Yes.

23

A. Because this is important in

24

25



1
2 my decision making, and that is he is described to
3 have a widely variable heart rate with changing
4 heart rate varying from bradycardia to ---

5 Q. Where are you reading from?

6 A. I am sorry, page 30. Page 34.

7 Q. I think that is on the 6th
8 of March.

9 A. Right. Leading up to - he
10 was admitted as you know with the history of
11 looking sick, feeding poorly several days before
12 he came in and then he had the episode of colour
13 changes and apnea at home. Then he was admitted.

14 He is described the 6th of March
15 as having bouts of tachycardia, 185 to 150,
16 bradycardia of 50. Respiratory rate varying. Tires
17 easily with feeds. Gagged. Became quite mucousy
18 which means he had a lot of mucus in his upper
19 mouth and upper respiratory tract I suppose. Cleared
20 his nasal congestion and then he was in no apparent
21 distress according to that note after that.

22 The next note is his heart rate was
23 143 to 178 regular. And then if we go on ---

24 Q. Just before you go on, do
25 not those notes indicate that the child seemed
to be in relatively sound stable condition?



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2

A. Well, not really.

3

Q. What do they indicate?

4

A. That he is having changing

5

heart rate with bradycardia episodes intermittent ---

6

Q. This is on the 6th?

7

A. Yes, intermittent with

8

tachycardia.

9

Then we go on you see further notes
to that effect on 3/8.

10

Q. I am sorry, 3/8?

11

A. On page 35. I am sorry,

12

8/3.

13

Q. That is the 8th of March?

14

A. Right. The 8th of March on

15

page 35. He has some tachycardia but his heart
rate was regular.

16

At that time he was feeding well

17

but then at 0300 he wasn't interested in feeding.

18

Went back to sleep. He is described as having a

19

congested chest with a loose productive cough.

20

And then at 4:10 he arrested according to that note.

21

On page 36 where we started this

22

note says that the arrest was called at 0425. He

23

suddenly developed an arrhythmia, no effective

24

output on his monitor. It looked like he had

25



1
2 ventricular fibrillation. Very irregular in size
3 and shape. He was oxygenated and so forth in the
4 attempt to resuscitate him.

5 The picture you get from both the
6 summary and his history on admission and the course
7 as described in the chart as you go through it is
8 a baby that was not well prior to his admission.

9 Q. Yes.

10 A. Was acutely ill. A baby who
11 remained ill and was having problems with feeding
12 and some changing heart rate during his hospitaliza-
13 tion, and then suddenly went into cardiac arrest
14 with ventricular fibrillation and could not be
15 resuscitated.

16 Now to me that is not typical of
17 a SIDS death. It is typical of a baby who had
18 some underlying serious illness.

19 Q. Let's just stop at the baby's
20 death which you refer to as cardiac arrest with
21 ventricular fibrillation and could not be resuscitated.

22 Would you not agree that that mode
23 of dying as Dr. Bain says is completely consistent
24 with SIDS, leaving aside the previous condition?

25 A. Well, the clinical description
of SIDS death is a baby who has been thought to be



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2 in normal health and is without any explanation
3 found dead with no sign of struggle. May have
4 a little bit of emesis in their mouth but really
5 no sign of a struggle and no explanation for the
6 death. SIDS is really a diagnosis of exclusion.

7 Q. That is your understanding?

8 A. That is my understanding.

9 Q. And just stopping you, Doctor,
10 and the question I asked you before we got into
11 this, I asked you about the mode of dying in the
12 Hospital being consistent with SIDS. Just dealing
13 with the mode of dying.

14 A. If you ignore everything else
15 and say that cardiac arrest could be consistent
16 with SIDS, I would agree with you.

17 Q. I don't think that even
18 Dr. Bain is suggesting that and I was not suggesting
19 that. I asked you about what you refer to as
20 cardiac arrest, ventricular fibrillation and could
21 not be resuscitated. Would you agree that that
22 is consistent with SIDS?

23 A. If you want me to consider
24 that along with his short hospital course I couldn't
25 agree that it is totally consistent, no.

Q. If you look at the next



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sentence it says:

"It is documented that 75% of SIDS deaths occur during the night and early morning hours."

A. Yes.

Q. Do you know sufficient about SIDS to agree or disagree with that?

A. I think I would agree with that.

Q. Then it goes on:

"The pathological findings of the thickening of pulmonary arterioles, persistence of brown fat, gliosis in the brain. In the region of the vagal nuclei and extra medullary hematopoiesis are the pathological findings of SIDS."

Are you able to agree or disagree with that?

A. I would agree to the extent that these are pathological findings that are seen in babies, some babies who die and are thought to be SIDS babies. I would not agree that every baby who dies of so-called SIDS has these findings and I would not agree that these findings are



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definitively diagnostic of SIDS.

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Q. Presumably you would agree, though, people actually present at the autopsy, people who actually performed at the autopsy, would be in a better position than you to assess what those autopsy - to assess and interpret the autopsy findings?

A. Well, depending on the validity of their description.

Q. Exactly.

A. Yes.

Q. Indeed there may well be things that they saw at the autopsy that aren't shown in the description?

A. Well, I hope they are complete.

Q. Well, indeed, but presumably in the course of a page or two it is not possible to record everything that one sees and presumably every doctor depends to some extent on eyes and hands and so forth in making his diagnosis?

A. I assumed when I read the autopsy report that they had described all the pathologically important findings. If they didn't then I could be in error.

Q. Once again I assume that a



1
2 .pathologist because of his training and experience
3 would be in a better position than you to interpret
4 those findings?

5 A. He would be in a better
6 position to describe the findings. I am not
7 necessarily sure that he would be in a better
8 position to clinically interpret those findings.
9 Certainly equally but not better.

10 I am not sure, but he certainly could
11 describe the findings better than I could.

12 Q. But you would be prepared to
13 put yourself on the same plane as Dr. Becker in
14 terms of interpreting?

15 A. Interpreting what I saw in
16 the ~~my~~croscopy?

17 Q. Interpreting the autopsy
18 findings as they relate to SIDS?

19 A. I don't think I would compete
20 with him in terms of pure technology. I am a
21 clinical paediatrician. He is a pathologist.
22 I see SIDS from one side of the death and he sees
23 it on the other side so I think we probably would
24 view it from a different perspective. And I certainly
25 wouldn't compete with him as a pathologist, no.

- - - -



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Q Can I ask you then to turn to the case of Justin Cook, Once again, we have some information from Mr. Cimbura. Do you recall when you received Mr. Cimbura's various reports?

A I think I received different ones at several different times but I can't give you specific dates. I might be able to eventually go through files and pick out cover letters that would indicate time of transmission if that is important.

Q Well, that's all right. Was it before you prepared your report for Mr. Wiley?

A Oh, yes. Other than the information that I didn't have at hand that I had the basis on which I made my revisions.

Q If you can look at page 2 of Mr. Cimbura's first report, it is Exhibit 95A and it is dated January 11, 1982. Do you have that, Sample T22?

A Yes.

Q Near the bottom.

A Yes.

Q There is a reference to fluid reported to be chest fluid and found to contain 70 nanograms per millilitre of digoxin and then it goes on to make reference to a .08 milligrams per cent of



E.2

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Lidocaine. Do you see that?

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A. Yes.

4

Q. Now, Doctor, there is no

5

reference in the chart of Justin Cook to that child

6

having received Lidocaine. Were you aware of that?

7

A. I was aware that there was no

8

reference in the chart that he had received Lidocaine

9

and I was aware that the Lidocaine had been detected
in this fluid, yes.

10

Q. Do you have an explanation

11

for that?

12

A. I don't have a specific

13

explanation. There are several possibilities that I

14

could speculate; one is that during a resuscitation

15

effort, or shortly before one of the procedures, is

16

to put in a cutdown frequently to gain access to the ...

17

Q. Into the vein?

18

A. ... into the vein. It is

19

common practice to inject Lidocaine at the site of

20

the cutdown to give local anaesthesia. Now, that

21

could produce - of course, that is absorbed and it

22

could produce a blood level of Lidocaine.

23

Q. Presumably, just stopping you

24

for a moment, that should be charted however if that

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is done?



E.3

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2 A. Yes. Well, it wouldn't
3 necessarily. You know, in the course - I don't know
4 the procedure and I wasn't there but it wouldn't
5 necessarily be charted because if everybody else - it
6 is not considered in that context to be one of the
7 resuscitation medications. The surgical resident
8 would simply be anaesthetizing the skin during the
9 cutdown and getting the catheter in.

10 The other possible way it could be
11 administered would be if it had been administered as
12 a part of the resuscitation effort to attempt to
13 convert the ventricular fibrillation. Lidocaine is
14 also used intravenously to decrease heart arrhythmias.
15 If it were used that way I would have expected it to
16 have been charted.

17 Q.

18 ?

19 A. I would accept that.

20 Q. Are there any other hypotheses
21 you have as to why that Lidocaine was detected?

22 A. Not off the top of my head, no.

23 Q. Let me suggest one to you and
24 that is the possibility that the drug was given in
25



E.4

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error at some point during the Hospital, say, possibly
at the time of the arrest?

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A. That the Lidocaine was given
in error?

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Q. Yes.

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A. That is a possibility, I suppose.

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Q. So then we really have three
possibilities. It may have been given when the cut-
down was done, it may have been given at the time of
the arrest but not charted, or it may have been given
at some time through inadvertence and not charted?

12

A. I would agree with that.

13

14

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Q. In the context of the arrest,
Doctor, and the possibility that it was given during
the arrest intentionally but not charted, do you see
that as a distinct possibility that in the tension
and hurry of the arrest a drug might be given amongst
many other drugs and the fact omitted from the chart?

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19

20

21

A. I would accept it as a
possibility. I have no way of assessing the
probability of it because I am not at this Hospital,
I know nothing about the resuscitation procedures and
so forth.

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Q. I appreciate that.

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A. But I would accept it as a
possibility.



E.5

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Q. Well, surely from your general knowledge as a physician, and particularly your specific knowledge as a pharmacologist, you are familiar with medication errors and the ways in which they occur?

A. Unfortunately, yes.

Q. Well, unfortunately in the sense that unfortunately they do occur?

A. That is what I meant, yes.

Q. And as long as we have people administering drugs we are going to have drug errors, obviously?

A. I think that is unfortunately true. We try to minimize it but they do occur.

Q. Well, part of the business of a pharmacologist is to know about drug errors and how they do it?

A. That would be a part of every physician's responsibility.

Q. Well, true enough, but a pharmacologist I would think because of his concern about drugs is perhaps more specifically interested in that area than others?

A. They could be.

Q. Well, indeed, you have written



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about the subject. The unit ~~does~~ system, for example, which as I understand it is a way of minimizing drug errors?

A. Yes, it is.

Q And as a pharmacologist, you are familiar with the circumstance that in arrest situations, again, unfortunately medication errors do occur?

A. They can occur, yes.

#5!
Q So, in dealing with this particular child, it is possible, and let us put it no higher than that, that one of two things happened during his arrest; it was either possible that he was given Lidocaine intentionally and it wasn't charted or possible that he was inadvertently given Lidocaine?

A. Or that he received it as a cutdown.

Q Fair enough, any one of those possibilities?

A. Yes, and I have no way of assessing the relative probabilities of those possibilities.

Q Fine. Now, dealing with Justin Cook and your various hypotheses about the dose that



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the child might have received. As I understood it, your range was, and I'm going to do it in terms I can understand in terms of vials, which is a bit simpler. You posited a range of between one adult vial and death occurring within an hour of the injection to 8-1/2 adult vials with death occurring within six hours after the injection. Do you see that?

A. I think that reflects my minimum and maximum estimates given the assumptions I outlined, yes.

Q. All right. And your evidence really was that your best estimate was that it was somewhere in between?

A. Yes. I didn't think it was less than an hour but I thought it was probably not much longer than three hours because of the elevated serum and the high fresh tissue levels.

Q. And then I would like to ask you to turn to your report to Mr. Wiley at page 5. Can you get that in front of yourself.

A. The first report, right?

Q. Yes.

A. Okay.

Q. And there, just down from the top of the page, the third line of page 5, you say?



E.8

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"The presence of a high concentration of digoxin in ventricular myocardium indicates that at least some distribution between blood and tissues occurred between the time of dose and time of death. Therefore, it is unlikely that death occurred less than one hour following the dose as assumed in the estimate of a minimum possible dose."

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And you have just told us about that.

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"On the other hand, it is difficult to conceive of the infant surviving very long with such a high concentration so that the onset of critical symptoms probably occurred within two to three hours of the delivery of the dose."

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19

20

Now, let's just stop there for a minute. Are you able to say when it was in Cook that you viewed the onset of critical symptoms as beginning?

21

A. Well, let me look at the chart and times in my notes.

22

Q. Thank you.

23

A. I don't have an index chart, so

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E.9

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if somebody can guide me to that part of it I would appreciate it.

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Q Well, maybe we can do this, I don't know if it will help you. But if you go over to page 3 of your notes to Mr. Wiley you point out in the first paragraph that at 3:30 a.m. on 22/3/81 he became irritable and developed increased cyanosis, had a generalized seizure and developed bradycardia followed by ventricular fibrillation approximately 30 minutes later.

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A The timing for the serum sample of course has to be timed at the time when the sample was taken but the time of critical symptoms I would agree, and I haven't found it in the chart yet, but I think I would agree based on my comments in the letter, I would have timed it at approximately 3:30 a.m.

17

18

MR. OLAH: Page 29 of the chart, Doctor.

19

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THE WITNESS: Page 29. Well, on page 27 there is a note that says "Child well until 3:45 and then increased cyanosis of extremities. Breathing okay, heart rate stable, oxygen increased."

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And at page 29 then it gives the time of 3:45 again. So, the things changed it looks like



E.10

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at about 3:30 to 3:45 a.m.

Q So, can we take that as being
the onset of critical symptoms?

A I think so, I think I would
agree to that.

Q So, you are using your two to
three hour estimate on page 5, we would be talking
back to 1:45 or 12:45 then as the time of the dose?

A Approximately that, yes.

Q So, somewhere between 12:45
and 1:45 is your best estimate then?

A I think the other day I timed
my estimates based on the serum concentration from
the time it was drawn. So, that makes that time a
little different and I would have to do the arithmetic.

Q Well, that's what I was
wondering about. I think yesterday or the day before
you said that you thought it was most likely one to
three hours prior to the time of the sample, somewhere
between one and three hours prior to the time of the
sample. The time of the sample we have been told is
4:30 a.m.

A All right, it was taken right
during the resuscitation effort, right.

Q That's right.



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A. Right.

Q. So taking one to three hours prior to 4:30 a.m. that places anywhere between 1:30 a.m. and 3:30 a.m.?

A. And if we time it from the sample we move an hour over.

Q. Well, that's right. But what I'm trying to find out, Doctor, is now we've got several ranges here. We've got 12:45 to 1:45 and then we've got 1:30 to 3:30 as being ranges. What I'm trying to find out is where you see the range being today. Maybe I can put one more thing in front of you.

A. Okay. I'm not sure I can be that precise on the range. You know, these are best estimates.

Q. Well, okay.

A. I know it is important to you and I'm not trying to hedge, it is just that we have to be very careful with all the variables that we are dealing with to try to tie it down to an hour.

Q. I think we all want to make sure that before you leave us hopefully tomorrow we are at least aware of what the uncertainties are and what the ranges are and that we are not stuck with



E.12

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one thing as being the gospel from Dr. Kauffman.

3

A. Right.

4

Q I don't think you would want
to leave us with that.

5

A. I understand that.

6

7

Q So, can I ask you to look at
your case report to the people at the Centers for
Disease Control. This is your little three-page
summary.

8

9

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THE COMMISSIONER: What exhibit is that?

11

MR. STRATHY: Miss Cronk has the tabs,
I don't have tabs on mine.

12

13

MS. CRONK: Tab 37 I believe, sir.

14

MR. STRATHY: Tab 37.

15

THE WITNESS: You are looking at the
score sheet for Cook?

16

MR. STRATHY: Q Well, I'm looking at
the ---

17

18

A. The last page of that scoring
sheet?

19

20

Q Yes. Do you have that, Doctor?

21

A. Yes.

22

Q Just to clarify for me, are
these your words on this page?

23

A. To my knowledge these were my

24

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E.13

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pencil written notes on the back page. To my knowledge, they typed them verbatim as I wrote them. I have never seen my pencil written notes since I wrote them and to my knowledge they retyped them verbatim. I have no reason to think otherwise.

Q I'm afraid I missed your evidence yesterday morning but do I understand that these were prepared separately from your letter to Mr. Wiley?

A Yes, these were prepared approximately one month prior to my drafting the report to Jerry Wiley.

Q Right. And you say on this sheet at the last paragraph:

"Digoxin was likely administered within one hour of the onset of terminal symptoms, although, this is speculative."

So, that puts us somewhere in the range of 2:30 to 3:30, within one hour of the onset. So now, Doctor, we've got three different ranges. I guess what we all need to know is, is it your evidence today that it could reasonably be somewhere within that time, anywhere from 12:45 to shortly before the onset of the terminal symptoms?



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A. I think-one of the problems I have is, and I think other people are having it too, is defining death in this child and some of the others, because death, actually, the event actually occurred over an hour or more period of time, so it is difficult to define. You can define the time in some of them when things seem to suddenly change; you can define the time when the resuscitation team finally said, we can't do anymore and stopped; but there is an intervening time which is really a no-man's land in terms of the time of death.

So at the time I wrote this I don't think I was consciously trying to be as precise as you are asking me to be today, obviously. In terms of trying to relate in some way an estimate, trying to relate an estimate of a possible dose to the serum concentration, I think I have to use the time that that sample was obtained.

Now in terms of trying to make any kind of relationship to the tissue concentration, I think I have to be more variable because we have got, not a specific moment in time of death occurring, but a period of time. So I suppose that I would have to, if you are really going to pin me down, I would have to say that the critical symptoms spanned a period of an



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F2 2 hour or so, and they started at about 3:45 and ended
3 with the end of the resuscitation effort at 4:30, is
4 that correct?

#6
4.56
5 Q. Approximately.

6 A. Yes. So I would have to say in
7 terms of considering the tissue concentrations I have
8 to take that span of time over which death was occur-
9 ring as a part of the whole time period in which I
10 estimate a dose could have most likely been given. I
don't know if that is helpful to you.

11 Q. Frankly I am not sure that it
12 does help me too much. I understand what you have said
13 about the problems of trying to pinpoint death. What
14 I am really trying to get at, doctor, and I think for
15 the Commission's purposes it is important, is some
16 idea of the range as to where in your best estimation,
17 and if you want to make it a broader range than you
have before that is fine.

18 A. Let me try to get at it this
19 way. I think because of the high tissue concentrations
20 it is quite unlikely that a bolus was given less than
21 an hour, because there had to be some time for distri-
22 bution to have taken place. Now more than an hour
23 becomes more difficult for me to define with the same
24 degree of certainty. I think that if this was
25



F3

1
2 digoxin intoxication, and I think it was, that the
3 effect of the digoxin was probably starting at this
4 3:45 period. So then the sample could have been -- I
5 mean the dose could have been given, my best estimate,
6 it could have been given some time during the three
7 hours prior to that. It could have been a little
8 longer, but I have a hard time getting much longer
9 than that because I would think that kind of dose
10 would have caused some severe symptomatology in a
11 somewhat shorter time than three hours. The literature
12 indicates that this can be variable enough that I can't
be more certain than that.

13 Q. So when you are talking about
14 one hour as being the boundary, if you will, you are
15 talking about one hour from the time of death, the
16 actual 4:30 to come to that?

17 A. Well, not necessarily. The
18 problem there is you don't know how much distribution
19 may have taken place during resuscitation. You know
20 that cardiac output is lousy during that time, it
21 really is very poor. So much less blood is profusing
22 most of the tissues during that time, but it is con-
23 ceivable that some digoxin could be carried to
24 tissues during that intervening time when death is
25 occurring, although it would be less if profusion is



F4

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2 normal I would predict.

3 Q. Let me put it to you this way.
4 Suppose we did have an IV bolus of one adult ampoule
5 at approximately 3:30, and you then have at a certain
6 time before the arrest, while the child's system is
7 working, an arrest with the various manipulative
8 efforts that we have seen taking place ultimately
9 death at or shortly after 4:30. Would that in your
10 view account for the both the serum and the tissue
11 levels?

12 A. I think it is much less likely
13 that it would account for it than for the dose being
14 given a little longer than that before the event
15 occurred.

16 Q. But it is at least within the
17 realm of possibility?

18 A. Yes, a lot of things are
19 possible. I just have to say -- it is hard to agree
20 that a lot of things wouldn't be possible, I can't
21 really disagree with that, but I have been asked in
22 the past and I am being asked now you know to try to
23 make possibilities.

24 Q. That is fair enough.

25 A. On the likelihood scale I think
what you just suggested is less likely than receiving



F5 2 the dose more than that, a little more than an hour.

3 MS. CRONK: I'm sorry, Mr. Commissioner,
4 I don't like to interrupt my friend. My friend may
5 have forgotten this and I don't know what effect it
6 has on the doctor's thinking, and it may be relevant
7 for Mr. Strathy's purposes.

8 The sequence of events recorded in
9 the medical chart is that the Code 25 is called at
10 4:20; the sample is taken at 4:30; the child is
11 pronounced dead at 4:56. Now obviously we don't know
12 when death occurred within that sequence of events,
13 I think the suggestion was made that the resuscitation
14 efforts stopped at 4:30, that is not the case.

14 MR. STRATHY: Thank you. I am grate-
15 ful to Miss Cronk.

15 MS. CRONK: It occurred some 20, 25
16 minutes later.

17 MR. STRATHY: Q. Let me just put
18 this to the doctor, then. Doctor, assuming again that
19 the IV bolus was one adult ampoule, that it had between
20 3:30 and 4:20 been distributed into the tissues before
21 the Code 25 was called, you then have the Code 25 at
22 4:20 and the sample at 4:30, that is the serum sample.

22 A. That is about an hour.

23 Q. And then subsequently post
24
25



F6

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2 mortem tissue samples.

3 A. Right.

4 Q. In that scenario do you see
5 the one adult ampoule at 3:30 being somewhat more
6 likely than what you have suggested to us?

7 A. You see the one adult -- I
8 understand what you are saying, I think the one adult
9 ampoule theory is even less likely, it becomes less
10 likely the further away from death we move, or further
11 away from distribution, possible distribution. Because
12 the only way that one adult ampoule hypothesis in my
13 mind would work is if you have virtually no distribu-
14 tion to tissues, that is my memory of those, and that
15 assumes no tissue distribution.

16 Q. So you say that your one adult
17 ampoule theory --

18 A. At 3:30 it becomes even less
19 likely with the times that we were corrected about.

20 Q. But it becomes more likely if
21 it is administered closer to death?

22 A. If it was given just before
23 circulation stopped, moments before circulation
24 stopped, then I would accept it, yes.

25 Q. Let me put to you this. Would
you be prepared to accept one adult ampoule, I gather



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you would, at or very near the time the ciruclation stopped?

A. I think so, yes.

Q. May I ask you this. Suppose that one adult ampoule is given intracardia, would that account in your mind for the tissue levels in the case of Cook?

A. I think if there were no circulation, even if -- you are talking about injected into the chamber of the heart?

Q. Yes.

A. I would have to think about that. I think if we are continuing the assumption of no effective circulation I would have a hard time even under those conditions accepting the kind of concentrations in fresh autopsy tissues that were described.

Q. Let us -- I am sorry.

A. I am sorry, go ahead.

Q. I was going to ask you to add the hypothesis of cardiopulmonary resuscitation taking place.

A. Well then we have circulation, some sort of circulation, we don't know how effective but some sort of circulation.

Q. That is the whole purpose of



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cardiopulmonary resuscitation?

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A. Right.

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Q. So in that hypothesis a direct intracardiac injection of digoxin at/or -- or at the time of the arrest followed by cardiopulmonary resuscitation, would that in your mind explain the tissue levels, or could it explain the tissue levels?

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A. I suppose it is possible, I think it is somewhat difficult. Because as you know distribution takes place over a period of hours with a half life of 30-60 minutes under normal circulatory status.

Q. That is talking there about distribution where the drug is administered either intravenously or orally?

A. Right. But still even with -- you see when you do an intracardiac injection you never know for sure whether you have put the needle into the right ventricle or the left ventricle. If you make your injection into the right ventricle; now Cook was such an anomalous baby that this does not all necessarily apply, because I think this baby had a single ventricle with a small right ventricle out-flow tract, am I correct in that?

Q. Probably more correct than I



F9

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2 can tell you.

3 A. With obstruction to her
4 pulmonary artery, so the abnormal anatomy makes it
5 difficult to speculate. But under those kinds of
6 conditions and the condition she was in with markedly
7 reduced pulmonary flow, most of the cardiac output
8 was going out to her body rather than to her lungs
9 at that point in time, what cardiac output there was.
10 So the blood injected into the single ventricle I
11 would predict would be distributed out to the body
12 before it returned and got back to the lungs to come
back into the heart again.

13 I don't remember specifically what
14 was described about the anatomy of her pulmonary
15 arteries, because the digoxin to get into the heart
16 muscle would have to be pumped into the coronary
17 arteries which profuse the heart muscle itself. I
18 don't remember if she had anomalous, any evidence of
19 anomalous pulmonary artery takeoff or not, I don't
20 think that that was described, I don't recall for
sure.

21 Q. Is it not possible in the
22 proposition that I have suggested to you that in the
23 course of administering the digoxin intracardiac there
24 is also contamination of the surrounding tissue with
25

Is there the slightest ev. to suggest
that dig may have been given
(presumably in error) by ~~the~~ intra-
cardiac injection?

Even if it were, ~~is~~ is it likely that
it could account for the fresh
myocardium concentrations?



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digoxin?

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THE COMMISSIONER: I'm sorry, in the
course of administering --

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MR. STRATHY: Digoxin intracardiac.

6

A. You mean in general making a
cardiac injection?

7

Q. Yes.

8

9

A. There's a possibility of
contamination of tissue of the pericardial sac with
whatever you are injecting, yes.

11

Q. Exactly.

12

A. I think that is a possibility,
yes.

13

14

Q. Thank you. Doctor, with
respect to Justin Cook we have the report of Dr.
Hastreiter which you have I think either seen or --

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16

A. You mean the clinical summary
that he prepared?

17

18

Q. Yes, he has prepared, do you
have that?

19

20

A. I can pull it out in just a
moment.

21

22

Q. I am not sure you have the
page numbers as I do.

23

24

A. No, I don't.

25



Kauffman
cr.ex. (Strathy)

F11

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Q. I am going to show you page 176.

3

A. Dated the 22nd of March?

4

Q. Yes.

5

A. I may have it.

6

Q. It is page 176 of Exhibit 264

7

and I commence at the bottom of the page, near the
middle of the paragraph where Dr. Hastreiter says:

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If one assumes that the infant
was given one large dose of intravenous
digoxin, the most likely time for this
to have occurred would have been just
prior to the infant's terminal
deterioration at 0330 hours."
I take it for the reasons that you



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have just given, you would disagree with Dr. Hastreiter as to the likelihood of that happening?

A. I don't know how strongly he feels about it, but I would disagree for the reasons I have stated with the statement as it is written here, yes.

Q. And if you could turn over the page, I don't know if you have a further page on Cook.

A. I have page 2 of that.

Q. All right. "It would have been extremely difficult for the infant to have maintained a plasma level of digoxin of about 70 nanograms per ml. for any sustained period of time without the development of fatal disturbances of the heart rhythm and death."

Now that is something that troubles me, doctor, because I would have thought simply from lay terms that that makes a lot of sense, that it would have been extremely difficult for the child to have maintained a level of digoxin of 70 nanograms per ml. without showing those disturbances. Do you agree or disagree with that?



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A. I haven't located the sentence
you are reading yet.

Q. Well, maybe --

A. I got the page here.

Q. Dr. Hastreiter seems to have
generated several reports so let me just show you.

A. Oh, I was on the wrong page I
think.

Q. Maybe my pages are out of order.
It is the top paragraph here.

A. Oh, yes.

I don't think that is totally
inconsistent with what I have said depending on what
he means about "sustained period of time".

There are - some of the case reports
in the literature on digoxin poisoning where it is
known that a child was poisoned where children have
maintained certain concentrations in this range for
a period of several hours without dying or maybe not
even showing --

Q. A range of 70 nanograms per
millilitre?

A. There is a case report that
was treated with FAB fragments a year or so ago, a
two or two and a half year old child, where the



G.2

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2 pre-treatment level was over 100 and the child survived.
3 With this treatment. But he wouldn't have otherwise.
4 But he had received that dose several hours prior. So
5 I don't know what he meant by "sustained period".

6 I agree with that if he would have
7 included in that a couple of hours. If he is talking
8 about several minutes I would not agree with it.

9 Q He seems to be talking about
10 a relatively short time because he says "this is the
11 basis for my statement that ... assuming laboratory
12 values are correct, digoxin was given shortly before
the infant's terminal episode of deterioration".

13 A I assume he is talking, when
14 he says "terminal episode of deterioration" around
15 3:30, 3:45.

16 Q That is what it seems to
17 indicate. So you don't necessarily go along with that
observation?

18 A Well, I am not sure - you know,
19 I am being asked to be a little more precise than he
20 is in his wording here so I am not sure I disagree
with it.

21 Again if he means moments before that
22 I would tend to disagree with him. If he is talking
23 about in terms of sustained period several hours I
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would not disagree.

Q A fair reading I think on page 1 he says "just prior to" and on page 2 of 3 he says "shortly before".

Now I take that to mean at least a relatively short period of time.

A I think we interpret "very shortly before" in terms of minutes let's say. Then I would view that as less likely than a little beyond that or prior to that time.

Q I think you do agree with Dr. Hastreiter in his No. 3 on the third page, the middle of the page. It is 177 in my book. He thinks the most likely route of administration is IV bolus?

A Yes, I agree with that.

Q Just by the bye, from your previous answer I take it that there is really no specific level of digoxin that you would regard as necessarily fatal?

A Well, the illustration I just cited would have been fatal had not the child received the antibody treatment.

Q That is a level of a hundred?

A Yes. This child was maintained with resuscitation efforts for two hours before he



G.4

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2 received the antibodies and then he received the
3 antibodies and he recovered in 35 minutes. So he
4 would have died with that level had he not been
5 treated with antibodies.

6 Q But is there a range that we
7 can look to that says, all right, if you are within
8 this range digoxin is necessarily fatal for a specific
9 child?

10 A I don't think we can define
11 a specific - I don't think we can say a specific level
12 is toxic or not toxic unless it is well above a
13 concentration that has been consistently associated
14 with death.

15 Q What are you talking about?
16 What level?

17 A That is difficult to say. The
18 literature describes levels anywhere from - that may
19 have been associated with death - my recollection is
20 anywhere from maybe 10 up to anything above 25 or 30.

21 It is extremely variable, and there
22 are also instances of patients having levels in the
23 neighbourhood of 10 or 12 and not showing - not dying
24 certainly and maybe not even showing much signs of
25 digitalis toxicity. So there is a tremendous amount
of overlap. That is what makes this drug so difficult



G.5

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2 to try and make any predictions about it.

3 Q So really in any particular
4 child it is difficult to say whether a level is or is
5 not going to be fatal.

6 A I think there are some levels
7 that you could say that is likely going to be fatal.
8 Once it starts distributing to tissues.

9 Now I think if I was told that a child
10 had a level of 50 or 60 or 70 or above within an hour
11 or two after administration, receiving a dose, I
12 would expect uniformly to see serious toxicity that
13 would be very likely fatal if no intervention were
taken.

14 Q Is it the digoxin in the serum
15 that kills the child or is it the digoxin in the
16 tissue?

17 A I am not sure how you - what
18 you mean. I am not sure what you mean by that.

19 When we talk about serum concentrations
20 we use it because that is what is available to measure
21 the drug in, and we try to relate that concentration
22 to what, to the total amount of digoxin in the body
23 and make some interpretation on that basis.

24 Q All right. I should be more
25 clear, then.



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A. If you mean is it the molecules of digoxin in the serum that is toxic or is it the molecules of digoxin in the tissues that causes the toxicity, then it is the molecules of digoxin at the moment of time that are in the tissues that are actually at that time causing toxicity.

Q. So it is the digoxin as I understand it working in the tissue that has a therapeutic effect and presumably it is the digoxin working in the tissue that has a toxic or fatal effect?

A. Yes.

THE COMMISSIONER: Not only that, but it is also only in some tissues. Some tissues we have heard it has no effect at all.

MR. SCOTT: I can't hear the question, Mr. Commissioner.

THE COMMISSIONER: Well, it is probably just as well because it is not that good, but my understanding --

MR. SCOTT: When one of these chaps ask a question I don't need to hear it but if you ask it I would like to hear it.

THE COMMISSIONER: Well I understand that not only is there no effect of the digoxin in the serum but there is no effect of digoxin generally



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speaking in the tissues. It is only when it gets to particular tissues and has the specific binding that it has an effect. Now I may have misunderstood that.

THE WITNESS: I think digoxin gets to all tissues.

THE COMMISSIONER: Yes. It doesn't get specifically bound --

THE WITNESS: A number of tissues have sodium ATP ase in the cell surface to which it can bind. We don't see with therapeutic doses, we don't see overt effects from that binding in many tissues.

For example, a lot of digoxin binds to red blood cells. That doesn't seem to change anything but it does bind to that specific enzyme in red blood cells but it doesn't cause a measureable effect that we know how to measure anything; it doesn't seem to change anything for the patient when it binds to red blood cells.

It binds to skeletal muscle. That doesn't seem to make any clinical difference.

It binds to sites in the brain and if the amount of digoxin gets a little too high you can actually have central nervous systems, toxic symptoms, from digoxin. And Dr. Wethering described

?Seizure activity?



G.8

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that in England back in the 1700's.

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You can actually have changes in vision. So I wouldn't agree totally that digoxin doesn't have an effect in a number of tissues, but the ones that we usually see are those on the heart. You can change - you can apparently have some effect on kidney function and it is hard to sort out whether that is indirectly due to increased heart function or whether it is a direct effect on the kidney.

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It can have some effect on smooth muscle and blood vessels various places. It can have some effect on brain cells, so it does bind to a variety of tissues both non-specifically and probably specifically, but the effect is variable.

16

17

Q

It is really the heart tissue that one is concerned about both for the therapeutic effect and the toxic effect?

18

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A.

Primarily you can have severe toxic effects for example from the effect on the brain too.

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Q

Just so that I am clear before I leave today, understanding your answer, it is the effect of the digoxin in the tissue that is the fatal effect?



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2 I said that also previously.

3 Q. But it is also important to
4 be aware of the qualifications that must be placed on
5 the other factors that one looks to in interpreting
7 digoxin data, specifically, the ambiguity, non-
6 specificity of the symptoms of digoxin intoxication?

7 A. Oh, I think that all has to
8 be taken into consideration, yes.

9 THE COMMISSIONER: Would this be an
10 appropriate time. I am sorry, were you finished
11 with Belanger?

12 MR. STRATHY: No, I am finished with
13 Belanger.

14 THE COMMISSIONER: Yes. Well, I
15 think we will take 20 minutes then.

16 ---Short recess.

17 ---On resuming.

18 THE COMMISSIONER: Mr. Strathy, I
19 hear everything you say, the witness hears every-
20 thing you say but apparently some of your fans do
21 not.

22 MR. STRATHY: Well, it is important
23 that the fans hear, Mr. Commissioner.

24 THE COMMISSIONER: Yes.

25 MR. STRATHY: So, I brought a microphone



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over here.

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THE COMMISSIONER: Right, okay.

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MR. STRATHY: I will do my best.

5

Q. Doctor, briefly, to touch

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on the case of Kristin Inwood, please, you have

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mentioned the digoxin concentration of 491 nanograms

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per millilitre found in the sample of serum and

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you have expressed fairly serious reservations

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about the integrity of that sample and the reliability
of that level?

11

A. Yes, based on what I was told.

12

Q. Does the level in and of

13

itself, 491 nanograms per millilitre, even apart

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from what you have told, does it not appear to you

15

to be so high as to raise serious questions about
its reliability for that reason?

16

A. Well, when I revised my

17

report and the comments I made on the letter of

18

January 17 I think I alluded to that. I thought

19

the statement I made I think it was something to

20

the effect that it was difficult to conceive how

21

it would be feasible to administer the volume

22

necessary to contain an acute dose which would be

23

expected to produce a serum concentration of this

24

magnitude. Now, how much less than the 491 it was

25



1

I can't say but I agree it seemed to be such a large number that it was difficult to explain.

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Q. And given that fact and given what we know about what happened to the sample, would you agree that it is virtually impossible to say what that sample means and what it represents?

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A. I really don't know what happened to that sample and for that reason it is difficult to interpret it.

10

11

Q. Well, really, it is impossible to interpret it, isn't it, unless we know what the level actually is.

12

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14

A. You can make some estimates but it is impossible to interpret it with confidence, yes.

15

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Q. Well, you can say that 491 is really 4 or you can say 491 is really 40 and you can say what flows from those different concentrations but I suggest to you it is really impossible to say whether 491 is 4 or 40?

19

20

21

A. Well, I wouldn't agree with you that it is likely that it is 4; 40 I would have no quarrel with you; 4 I think is unlikely.

22

23

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Q. How about 10?

A. I don't know.



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Q. All right.

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Now, can you turn please to the case of Stephanie Lombardo. You discussed with Miss Cronk yesterday the theory that the child's shunt might have occluded and I simply wanted to put to you this proposition that if the shunt did occlude it would explain the child dying when she did and the way she did. Do you agree with that?

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A. Yes, that was one thing I considered. Unfortunately, I have no information one way or the other to confirm that but that was one thing I considered, yes.

20

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Q. And it would certainly explain it, would it?

A. Yes, it could explain it.

Q. And indeed the absence of a shunt murmur or the inability of the resident to detect a shunt murmur just prior to death would be consistent with the hypothesis that the shunt did occlude?

A. Yes, it would.

Q. Thank you. Now, again, previously on the levels in the case of Lombardo which we know are from autopsy, exhumed autopsy tissue, do you agree once again that those exhumed



11 1
2 levels, if indeed they do show digoxin or if they
3 mean digoxin, really tell us nothing about the amount
4 of the dose, the time the dose was administered,
5 the manner in which the dose was administered and
6 'the relationship between the dose and death?

7 A. I agree, I don't think we
8 can make reasonable estimates based on the tissue
9 concentrations.

10 Q. And for all the reservations
11 that you have expressed in your report and your
12 letter to Dr. Smith?

13 A. That is correct.

14 Q. Well then, I want to ask you
15 to go please to your case summary which you have
16 prepared for the people at the Centers for Disease
17 Control.

18 A. Let me locate that.

19 MS. CRONK: That's Tab 23, sir.

20 THE COMMISSIONER: Lombardo are we
21 talking about?

22 MR. STRATHY: We are talking about
23 Lombardo.

24 THE COMMISSIONER: Yes, all right.

25 MR. STRATHY: Can we turn to what may
be the third or fourth page of that summary, Doctor,



1
2 where there is the typewritten comments. The
3 comment that troubles me in view of what you have
4 said about the reservations concerning exhumed
5 tissue is your comment on the likely route, dose,
6 timing of administration where you say - do you have
7 this?

8 A. I am getting it.

9 Q. Okay, I will give you a moment
10 then.

11 You say:

12 "IV bolus or rapid infusion shortly
13 before death 30 to 60 minutes",

14 and I just really, in view of what you have just told
15 us and all the reservations expressed in your report,
16 your letter to Dr. Smith and so forth, that really
17 that statement is impossible to make based on the
18 exhumed tissue?

19 A. It is impossible to make
20 solely on the basis of the exhumed tissue, yes.

21 Q. Well then, the only other
22 fact that might come into play was the child's
23 terminal event?

24 A. That is correct, and the
25 serum potassium elevation bothered me too.

Q. All right. But you have told



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2

us really the terminal event itself, as we have
heard in so many other cases, is ambiguous?

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A. I am not sure what you mean
about the ambiguous terminal event.

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Q. Well, what I mean is the

terminal event itself is not inconsistent with digoxin toxicity, or is consistent with digoxin toxicity, but it is also consistent with the child dying in the manner that I have posited to you?

A. That is correct.

Q. And indeed the child's serum potassium in and of itself is not necessarily indicative of digoxin toxicity as being the cause of death?

A. No it is an inconsistent finding.

Q. But it is not inconsistent with other physiological findings?

A. I don't remember. Well, it is inconsistent with some physiological conditions, yes.

Q. It is not inconsistent with the child's underlying physiological state?

A. Well I think if you are referring to her condition before her sudden change when she had her arrest --

Q. Let's go to that --

A. We had better turn to the chart.

Q. All right, can you do that please.



1
I2 2 A. Because I don't remember
3 specifically when that sample was run and it is
4 important.

5 Q. That is what I wanted to ask
6 you.

7 A. If we can find --

8 Q. I think you should do your
9 thinking to yourself and when you have had a chance
10 to find that --

11 MS. CRONK: That is 102.

12 MR. STRATHY: 102, thank you.

13 A. Did I refer to the description
14 after the terminal event or the laboratory --

15 MS. CRONK: The laboratory.

16 THE WITNESS: Okay, that is noted
17 at --

18 MR. STRATHY: No time.

19 A. No time noted on December 23,
20 which was the date of death.

21 MR. SHANAHAN: Mr. Commissioner, if
22 it would assist, page 19 Dr. Halpern in doing his
23 summation indicates at line 3:

24 "About ten minutes after the arrest
25 the pH was 7.16..."

And he goes and he says:



I3

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"The potassium was 7.4 not hemolyzed."

3

So it seems to me that Dr. Halpern

4

is putting a time on that on December 23rd.

5

THE WITNESS: So that was obtained
shortly into the arrest.

6

7

MR. SHANAHAN: Ten minutes into the
arrest.

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THE WITNESS: Thank you.

9

10

MR. SHANAHAN: If you can locate
page 19.

11

THE WITNESS: In the chart?

12

MR. SHANAHAN: In these charts that
you might have, Exhibit 78, sir.

13

14

THE WITNESS: Thank you.

15

16

MS. CRONK: Doctor, if you turn to
page 41 of the progress notes you will see the
medical resident's notes as to the arrest and that is
where the level is noted.

17

18

MR. STRATHY: Q. All right, would
you read that out, doctor, from the notes.

19

20

A. Okay. This note is timed
December 23 at 0425 is the time of the note. The
note is:

21

22

"Called at 0330 regarding irregular
apex and bradycardia. Baby cyanosed.

23

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I4

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Cool extremities; weak pulses; heart rate irregular 50-180 with variable QRS patterns. No murmur heard."

Q. Just stopping you there, the "no murmur heard" if the shunt was operating properly and was not occluded one would expect to hear a murmur would they not?

A. You would expect to hear a murmur. Now because of her arrhythmia her cardiac output had suddenly decreased you might not hear a murmur and still have a patent shunt, so it is ambiguous.

Q. All right.

A. Then at 3:40:

"Vomited - suctioned. 3:45 arrest - ventricular fibrillation massage started.

3:48 25 team taking over resuscitation."

And at 0400 a blood sample was apparently obtained which would be approximately ten minutes, fifteen minutes into her arrest. The pH was 7.16, and the other blood gases were abnormal, consistent with the arrest and her potassium was 7.4 at that time.



I5

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2

Q. Does the arrest itself result
in changes in potassium chlorides and so forth?

3

4

A. Yes, and as I pointed out the
other day the drop in pH due to the arrest can also
account for it, at least in part, not totally.

5

6

7

Q. So would you agree that one
explanation for that potassium may be the very fact
that it was taken after the arrest had begun and as
a result of the arrest having occurred?

8

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A. That is correct, that is why
I wanted to assure myself as to when it had been
obtained.

11

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Q. Thank you. Doctor, finally,
Allana Miller please. If you could turn to your
own report or your letter to Mr. Wiley, at page 5,
at the very bottom of the page. You refer to the
digoxin concentration in the myocardium of between
5 and 7 nanograms per gram, that is tissue preserved
in Klotz solution. That would seem to be not simply
low but really very very low tissue levels.

20

21

22

A. If I recall correctly those
were among the lowest concentrations in fixed tissues
of all of the patients.

23

24

25

Q. And it is the low level in
the tissues of Miller that caused you to posit that



I6

1
2 the administration of digoxin occurred very close to
3 the time, relatively close to the time of death?

4 A. Yes, that is correct. And
5 given the vagaries of those concentrations in
6 attempting to place a time that influenced me to
7 suggest that it could have occurred shortly prior to
8 her death.

9 Q. And I just wanted to be clear,
10 doctor, would you go so far as to say that in the case
11 of Miller it is possible in view of those low tissue
12 levels that the child received a dose of digoxin at
13 or very near the time of the terminal symptoms, as you
14 call, them developed?

15 A. I think it is possible that
16 she could have received it shortly enough before the
17 time that there would have been minimal tissue
18 distribution.

19 Q. And by shortly enough would you
20 be prepared to accept something in the five to ten
21 minute range?

22 A. Well at least fifteen minutes.

23 Q. And again that would be on a
24 hypothesis of as little as a single adult vial of
25 digoxin?

A. I think that is consistent with



1
I7 2 my estimates, yes.

3 MR. STRATHY: Thank you, doctor.
4 Those are all my questions, Mr. Commissioner.

5 THE COMMISSIONER: Yes. Thank you,
6 Mr. Strathy. Mr. Scott.

7 CROSS-EXAMINATION BY MR. SCOTT:

8 Q. Doctor, while we are dealing
9 with it and you have the file at hand, the Miller
10 file at hand, perhaps I can just clean up some
11 matters that concern me about Miller.

12 First of all this baby was about a
13 year old approximately and I think about 6 kilos on
14 admission, is that right?

15 A. She was eleven months according
16 to my notes, I don't know about her weight.

17 Q. All right.

18 A. Let me look to see what I
19 assumed. I assumed a weight of 6.11 kilos, so I
20 must have gleaned that from the chart.

21 Q. And the record reveals that
22 Allana Miller had been on digoxin therapy for most if
23 not all of her life, is that your understanding?

24 A. I think that is correct.

25 Q. I am telling you things that I
think are correct, and if you want to look it up or



I8

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disagree with me you tell me.

3

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A. I can confirm that. Yes, she had been on maintenance oral digoxin 0.3 mg. twice daily for a number of months.

6

7

8

9

Q. And the chart reveals, and I don't have the page, but at 9:00 p.m. on the day before her death, on the 20th, she received 0.032 mg. orally. Do you want to check that out just to be sure I have it right.

10

11

A. Yes, that seems consistent with --

12

13

14

Q. It is at page 38 of the chart I think. I am not a doctor and barely a lawyer so I want to be sure that I am reading this right.

15

16

A. I would agree with your comment you are not a doctor; I wouldn't agree with your comment that you are not a lawyer.

17

18

Q. I can tell you there are a number here who will make up for that reservation of yours.

19

20

Do I read that right that at 9:00 p.m. Allana would have received 0.032 mg. orally?

21

22

23

24

25

A. At 2100?

Q. Yes, you see I am pre-metric, that is nine o'clock.

A. Okay, yes.



I9

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Q. And I think her chart reveals
that the terminal events --

THE COMMISSIONER: You can't blame
the 24-hour clock on metric, can you?

MR. SCOTT: Why not we seem to blame
everything else on metric.

Q. The chart also reveals that
her terminal event began some five and a half to
six hours later.

A. I believe that is correct.

Q. All right.

A. At 1:45 a.m. I have in my
notes.

Q. Now Mr. Cimbura's readings of
the serum levels I think are 69 and 78, or somewhere
in that highly elevated level.

A. I have on my notes, if they
are correct, that the 78 was done at Sick Children's
and the 69 was obtained at CFS.

Q. All right. But there are those
two serum levels obtained?

A. That is correct.

Q. And there are tissue levels
also obtained, do you have those in front of you?

A. I have myocardium levels of 5



I10

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2

and 7.

3

Q. Have you got a lung level of 4?

4

A. I didn't have in my notes, if
you can point me to the report.

5

6

Q. I think if you look at Mr.
Cimbura's document, which is Exhibit 95, do you have
that?

7

8

A. Yes, if I can find Allana
Miller.

9

10

Q. It is page 5.

11

A. Okay.

12

Q. And that is where you obviously
got your 5 and 7 for heart tissue, half-way down the
page the right-hand side.

13

14

A. Yes, I see it now.

15

Q. Then there is a lung tissue
isn't there for 4 just below that?

16

17

A. Yes, that is correct.

18

Q. A level of 4; there is a fluid
level of 4 below that.

19

20

A. That is correct.

21

Q. Then there is a lung fluid
level of 5.4.

22

A. That is correct.

23

Q. And those essentially are levels

24

25



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2 with which we have to work in the case of this baby.

3 A. In terms of tissue?

4 Q. Yes.

5 A. Yes.

6 Q. And you have already given us
7 the serum levels?

8 A. That is right.

9 Q. Now I understand from elsewhere
10 in the testimony that a therapeutic level in heart
11 tissue would run the gamut anywhere I think from 49 to
12 900 odd, is that correct?

13 A. In that general range, yes.

14 Q. Yes.

15 A. I should say that those are
16 concentrations which have been measured in people who
17 were thought to have been receiving therapeutic doses
18 and who exhibited no toxicity.

19 Q. Right. So that is the problem
20 we have to work with. Now the thing that caused me
21 trouble with the Baby Miller case is here you have a
22 baby who has been digitalized for most of her life
23 and produces a high tissue level way below any
24 therapeutic level, right?

25 A. Well I will agree that she has
a level in fixed tissues way below the level you would



1
112 2 expect in a digitalized baby.

3 Q. Yes, and I will put it you
4 way below a level you would expect in a baby who
5 had been digitalized some six hours before, or seven
6 hours before.

7 A. She had not been digitalized
8 she received a maintenance dose.

9 Q. Right.

10 A. But that is not the same as
11 being digitalized.

12 Q. I see, I'm sorry. By digital-
13 ized you mean initiating doses, do you?

14 A. I mean she has enough digoxin
15 in her body to produce a pharamcologic effect.
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25



Kauffman, cr.ex.
(Scott)

J
EMT/cr

Tissue fixed
in Klok
stuck for
many months!

1
2 Q. What I am suggesting to you,
3 the problem I am having difficulty grappling with,
4 is here you have a baby who because of her heart
5 difficulties is on digoxin therapy and has been on
6 that therapy as far as we know consistently for some
7 long period of time, or relatively long, and yet
8 a tissue level shortly after death shows a level
9 below the normal therapeutic range and substantially
below.

10 Have I stated what we see?

11 A. Well, if we can accept that
12 number. I think I understand what you are saying.

13 We have a level in tissue that is
14 quite low. It would be extremely low for fresh
15 tissue. The problem in talking about it is that
16 it is fixed tissue. Again it is this problem that
17 we face with all of them. But, yes, it is a very
low concentration.

18 Q. Leaving aside ---

19 A. And yet she was supposedly
20 receiving the drug during the month prior to
admission.

21 Q. And leaving aside any murder
22 case or anything like this, if we knew about that,
23 just taking Miller in isolation, wouldn't it raise
24
25



1
2 a question about whether the digoxin therapy was
3 having the desired therapeutic effect because it
4 wasn't getting into the heart in sufficient
5 quantity?

6 A. Well, looking at this, my
7 main question was and still is, whether she was
8 actually getting her medicine before she came in
9 the Hospital. She had a very low serum level when
10 she arrived too.

11 Q. That, you see, is to raise
12 another spectre and you may be entirely right about
13 that, but what I am suggesting to you is that if
14 you leave out the excitement of the murder case
15 for the moment and just look at what we know about
16 this baby, isn't there a question to be asked about
17 whether digoxin was - assuming she was being
18 administered - was getting to the place it has to
19 be getting in order to do its work? That is, the
20 heart.

21 A. I really have no precedent
22 at all to assume that. I think the fallacy in
23 this, in the assumptions that are inherent in what
24 you just said is that she was getting her medicine.
25 The most likely probability is that she wasn't
getting her medicine at home



1
2 because that is something we see all the time in
3 patients who come in ---

4 Q. Well ---

5 A. - who come in with levels
6 that are not what they should be, and that is
7 consistent with her low level in serum when she
8 arrived at the Hospital, and I suspect that that
is really what was happening.

9 Q. Well, look, let me ask you:
10 it is difficult to answer an irregularity that I
11 present to you by posing another irregularity even
12 though it might be quite possible that the mother
13 didn't do her job by administering the ---

14 A. I think it is highly likely.

15 Q. Well, I know, but it doesn't
16 answer a problem on the case by saying, well, it's
all the mother's fault.

17 Now I ask you to assume - you made
18 the odd assumption in your testimony over the last
19 two days - I ask you to assume that the mother
20 was administering the digoxin as prescribed, and
21 that there was in the Hospital an administration
as noted at 9:00 p.m.

22 Now I suggest to you on those two
23 assumptions the level of 4 in the heart post mortem
24
25



1
2 raises a question, doesn't it?

3 A. If you make the assumption
4 that she was getting her medicine and she was
5 eliminating it at the rate that most kids that
6 age would, and if she had serum concentrations that
7 you would expect on her maintenance dose and the
8 maintenance dose was appropriate for her size, you
9 would expect her concentrations to be higher than
10 that. I suspect even in fixed tissue, but let's
11 say that her fresh tissue concentration was 30
12 I can't say that it couldn't be 6 in fixed tissue,
13 so that is the problem I having.

14 Q. Well, what I am suggesting to
15 you, it is all very well to make assumptions of
16 irregularity. But let's for the moment make an
17 assumption of regularity, that the mother did what
18 she was told to do, that the person who says they
19 administered digoxin at 9 o'clock orally did so
20 and I suggest to you if that is so this level raises
21 a question. I put it no higher than that.

22 A. Yes. It is difficult to
23 explain, you are right.

24 Q. Okay. Now what I want to
25 suggest to you is a possibility - I don't put it any
higher than that. A possibility is that for some



1
2 reason that we don't understand having to do with
3 the physiology of this child, the digoxin is not
4 making its way to the heart. Now that is a
5 possibility with which we have to contend, isn't
6 it?

7 A. I suppose anything is possible
8 in the universe. It seems so - I mean it is so
9 different than anything that has been described in
10 nature to date with this drug that I find it difficult
11 to believe it as a possibility, but there are a lot
12 of things we don't know so ---

13 Q. Exactly.

14 A. - so I can't say it isn't a
15 possibility. It seems very remote to me.

16 Q. And there are a lot of things that
17 we have learned in the last year aren't there?

18 A. Yes, but none of them would
19 suggest that this possibility would be any more
20 probable.

21 Q. All right. But the problem
22 that you confront then is the serum level which is
23 very high?

24 A. That is correct.

25 Q. And you say that that must
be or is probably another dose after 9:00 p.m.,



1
2 illicit, which has not yet worked its way into the
3 heart, which has not been distributed?

4 A. Yes, that is my hypothesis.

5 Q. What I am asking you is
6 where is the distributed digoxin that was administered
7 at 9 o'clock?

8 A. Well, you are giving me - to
9 answer that, if I answer that with all the assumptions
10 you have given me, then I can't explain it.

11 Q. So that ---

12 A. If I answer it with what
13 I think were the facts as the most probable situation
14 then I can explain it.

15 Q. Let me ask you this: if this
16 child was a normal child and was - I mean if there
17 was no unique feature of her case and she took and
18 reacted and absorbed digoxin normally, what would
19 you expect after an oral administration of digoxin
20 at 9:00 p.m. to find in the heart tissues some six
21 or seven hours later?

22 MR. HUNT: I am sorry, Mr. Commissioner,
23 my friend keeps referring to this as if it is fresh
24 heart tissue, and we started off with fixed.
25 Perhaps we should ---

MR. SCOTT: Q. Well, the Doctor can



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2

answer it either way he wants.

3

A. If your assumption is correct

4

that she was fully digitalized and then we assume

5

that her fresh, her living tissue concentration was

6

something above 45, I wouldn't expect that

7

concentration to change significantly after a
maintenance dose.

8

Q. So it would be what?

9

A. Well, it would be ---

10

Q. What level would you anticipate?

11

A. With the assumption that she

12

had already digitalizing amount of digoxin in her

13

body which is the assumption we started with I
think.

14

Q. Yes.

15

A. And so that would mean based

16

on the literature her myocardial concentration

17

before she got that maintenance dose was something

18

above 45.

19

Q. Yes.

20

A. Given the range we agreed on,

21

then I would not expect a maintenance dose to change

22

whatever her pre-existing myocardial concentration

23

was, change it significantly.

24

Q. It would maintain it?

25



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2

A. It would maintain it.

3

Q. At 45?

4

5

6

A. At whatever it was. 45 or whatever it was above that. I am using the range that we agreed on, 45 to 900 and some.

7

8

9

THE COMMISSIONER: I wonder, you may be asking, but if we take the other assumption, namely that the mother had not been giving digoxin, but we still have this dose at 9 o'clock.

10

THE WITNESS: Yes.

11

12

THE COMMISSIONER: And five or six hours later ---

13

14

THE WITNESS: I think that is the most likely thing. I think that ---

15

16

MR. SCOTT: Q. Could I interrupt to ask you why. Do you know the mother?

17

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A. No, but I know what has been described over and over in the literature about medication administration practices by individuals and parents, and I know what I see every day of the week when we measure drug levels in people on an out-patient basis, and I know what I wrote about it a couple of years ago on drug compliance, so I don't think this mother would be any different than any other mother if the kid didn't get her medicine



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2

part of the time.

3

THE COMMISSIONER: Assuming that she
hadn't been getting her medicine.

4

5

THE WITNESS: Okay.

6

THE COMMISSIONER: Assuming that the
dose was given at 9 o'clock the night before ---

7

8

THE WITNESS: I think these fixed
tissue levels are not inconsistent with that
scenario.

9

10

A single maintenance dose of this
size would not - if she had not been getting her
medicine, she didn't have very much digoxin in her
myocardium to start with and she got this maintenance
dose the evening of admission, I would not expect
her myocardial digoxin level to be much higher than
this.

11

12

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16

THE COMMISSIONER: Excuse me, Doctor.
Like you, Doctor, and more than you, Doctor, I have
trouble distinguishing these children. When did
this child come into the Hospital?

17

18

19

20

THE WITNESS: I would have to look
at the chart.

21

22

THE COMMISSIONER: What I am really
getting at, is this the only ---

23

24

25

MR. SCOTT: Q. She came into the

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Hospital on the 19th and she had a dig. level of
.6 on the 19th.

3

4

A. That apparently was a level
drawn shortly after her admission.

5

6

Q. Yes.

7

A. Is that correct?

8

Q. Yes. I am looking for the
time and I still can't read these things.

9

THE COMMISSIONER: Was this the first ---

10

MR. SCOTT: It is page 88.

11

THE COMMISSIONER: Was this the
first that ---

12

13

MR. SCOTT: It says no time, so it
is not much help except that it was on the 19th, and
presumably before 2130.

14

15

THE COMMISSIONER: But was this the
first dose that she had, this digoxin dose at
2100 on the 20th?

16

17

MR. SCOTT: She was supposed to be
getting digitalized at home.

18

19

THE COMMISSIONER: Yes. Well, I
understand that.

20

21

MR. SCOTT: But this was the first
dose in the Hospital.

22

23

THE COMMISSIONER: Yes.

24

25



1
2 MR. SCOTT: Q. She came into the
3 Hospital, as I understand it, and Doctor, you tell
4 me if I am reading anything wrong, certainly on or
5 before March 19th and she had a dig. level on the
6 19th, no time, of .6. Have I read that right?

7 A. That is my understanding, yes.

8 Q. So doesn't that suggest that
9 before she came into the Hospital she had been having
10 some dig.

11 A. I think she had some dig., yes.

12 Q. Yes.

13 A. I think we have to accept that.

14 Q. The competing or I shouldn't
15 call them theories or the assumptions - your
16 assumption based on your experience is that the
17 parents may never have been administering or may
18 have overlooked the administration or forgot to
19 do it or done it inefficiently or something of
20 that type?

21 A. Probably missed some doses.

22 Q. Yes.

23 A. Not all of them but some of
24 them.

25 Q. Against that I take it you
have to weigh the fact that when the child came to
the Hospital there was a reading of .6 produced?



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A. That doesn't really bother me.

Q. It doesn't?

A. No.

Q. It doesn't show you that the child has been receiving digoxin at home?

A. I am not denying she received digoxin. I am saying she was not getting all that she was supposed to receive.

Q. I see.

A. In fact this is consistent with that because it is well below what I would predict if she was getting that maintenance dose consistently.

Q. All right. So I take it that - what do you say about the possibility that dig. is not making its way to Allana Miller's heart as might be anticipated? What do you say about that possibility? We are talking about possibilities in this case as you have been from beginning to end. What do you say about it?

A. I say when I hear hoofbeats I think horses.

Q. Well, that doesn't help me with my possibility. You hear hoofbeats in my possibility?



1

2

A. I think that ---

3

Q. You have never heard a

4

camel's?

5

A. That is right. Certainly not

6

in Toronto. But I think that that - and I am not

7

being facetious; I really am not - I really honestly
think that is such a remote possibility I can hardly

8

consider it.

9

Q. All right. But the one

10

thing we know, don't we, is that even on your

11

theory that there was a supplementary dose of

12

digoxin, to use the neutral phrase, some time before

13

death, that digoxin probably did not kill this

14

baby?

A. Which digoxin?

15

Q. You posited to explain the

16

serum reading, you posited a dose of digoxin after

17

the oral administration at 9:00 p.m. and before

18

death?

A. Right.

19

Q. Now I suggest to you that

20

on the readings if there was such a dose, and there

21

is no record of it, but if there was, and if it

22

explains the serum reading ---

23

A. Which serum reading? Of 70?

24

25



1

2

Q. Of 70.

3

A. Yes.

4

Q. It obviously didn't kill the

5

baby because it didn't get to the heart whereas you

6

have told His Lordship earlier that is where it

7

acts. Or indeed any of the other tissues of which

8

we have knowledge.

9

A. I am not sure I can say that.

10

Q. Well let me tell you: the

11

conundrum of the Miller case is a very high level

in the serum and low levels in the tissues?

12

A. Right.

13

Q. Exactly the converse of what

one normally would expect?

14

A. Not necessarily.

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Q. All right. Exactly the converse of what one would normally expect if digoxin had only been administered some six hours before?

A. That is correct.

Q. Yes. And to explain that, there are a number of possibilities: the mother wasn't doing the job, that is one that you have advanced to me.

A. You are talking about the low concentration?

Q. Yes. The second possibility is an injection, an unauthorized injection after 9:00 p.m. and before death?

A. Right.

Q. But I take it even on that possibility it cannot be said that that digoxin found its way to the heart. It is clearly in the serum.

A. I don't agree totally with what you have just said. There was digoxin in the heart.

Q. But very little.

A. Well, we don't know that for sure because these were fixed tissues and we just don't know that. The numbers we have are little but we just don't know that it was that little.



K2

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Q. All right.

3

A. The other thing we don't know

4

is how much of the digoxin that was in her heart was

5

bound to the specific receptor and was causing some

6

change in cellular activity, we just don't know that.

7

So, I don't think I can agree with you totally that

8

there was no digoxin causing any effect in the heart

at the time of her death.

9

Q. Isn't that a possibility to

10

be considered?

11

A. I suppose it is something

12

again I would have to agree is a possibility. I think

13

it is somewhat unlikely.

14

Q. All right.

15

THE COMMISSIONER: Tell me this,

16

doctor. Supposing you have got no digoxin in your

17

heart at all and you get a dose of digoxin and in the

first instance when it goes into...

18

THE WITNESS: Into the heart?

19

THE COMMISSIONER: It goes into the

blood.

20

THE WITNESS: Yes.

21

THE COMMISSIONER: And it distributes

22

itself slowly to the heart. Now, can the very first,

23

if it is a large dose, can the very first distribution

24

25



K3

1
2 bind itself in some way in the heart so as to kill?

3 THE WITNESS: In my opinion, yes, it
4 can. Let me explain why. Usually the definitive
5 receptor has a higher affinity for the drug that
6 binds to it than any other binding sites. So that the
7 first molecules that get there are sucked up by the
8 specific receptor or the specific binding site with the
9 highest affinity. Once those are saturated or
10 approaching saturation, probably not totally saturated
11 but approaching saturation, then additional drugs that
12 come in start binding to sites with less affinity.

13 What we are measuring here is total
14 digoxin which includes both specifically bound and
15 non-specifically bound and we are measuring it in
16 fixed tissue where some of the digoxin presumably
17 that is less tightly bound has been leached out into
18 the fluid. So, that is why I can't agree that a dose
19 given as high as postulated would not possibly cause
20 death. Have I answered your question?

21 THE COMMISSIONER: I think you have,
22 I think you have.

23 MR. SCOTT: Q. Well, let's just see
24 if I understand it. The high level in the serum, the
25 low level in the tissue, that's the conundrum that I
present to you, you answer it effectively by saying,



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well, the low level in the tissue is -- do you answer
it by saying: For the drug to have killed the baby
I would expect if we could see live tissue, a high
level in the tissue?

A. No, that isn't what I said.

Q. All right, what do you say?

A. Well, if you will allow --

Q. Can I first ask you one
question?

A. Yes.

Q. What level, if you could take
a sample in a baby at the moment of death from its
heart, in this baby at the moment of death from heart
tissue, what kind of level would you anticipate?
Give me a range.

A. Well, if there had been no --
if the baby died instantly, this is quite hypothetical,
but if the baby died instantly and you would accept
that that level would be essentially the same as it was
in life, then I think we can use levels that have
been measured at surgery and a baby undergoing surgery
as a guideline for that.

Q. Yes.

A. And as you have mentioned
earlier, those concentrations vary from somewhere



K5

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around 40 to 900 and something.

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Q. Well, I'm sorry, let me see if I can put it to you this way. We know that there was a reading of .6 when the baby was admitted, serum level, or shortly after admission, we know an oral administration and its volume at 9:00 p.m., we know a post mortem serum level, we know some post mortem tissue levels. All that is the given paraphernalia with which we have to work. You have suggested, and I accept it, that there was an illicit - I use that word because I can't think what to call it - an illicit administration of digoxin sometime before death, and I forget what time you posited. It doesn't matter for my example.

15

A. Well, relatively within an hour I think I said, I don't remember for sure.

16

17

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Q. All right. Now, let's assume that you are right about that. If you had been able to take a tissue sample at the moment of death, if you had been able to accurately measure a heart sample at the moment of death, what range would you have expected to find there in that scenario?

22

A. Are you assuming digoxin there in a therapeutic amount prior to that dose or not?

23

24

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Q. I am assuming only what we know



K6

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that there was a .6 serum reading the previous day,
that there was an administration at 9:00 p.m. and that
the baby was supposed to have been on digoxin therapy.

A. Okay. If I assume that there
was a digitalizing amount in the heart prior to this
hypothetical dose being given, I would again expect
that that -- we are saying, are we, that it was
given shortly before death?

Q. Well, at the time you suggest,
an hour.

A. Yes. I would expect under
those conditions for the concentration in the heart
to be somewhere in the range we have just described.

Q. Namely?

A. 40 to 900, you know, this
rough range that has been described in babies on
therapeutic doses.

Q. And that may have killed the
baby?

A. It could have, yes.

Q. Yes, all right.

A. There is such a large overlap
that it is hard to say.

Q. But that is a scenario that you
adopt on the assumptions you have given --



K7

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A. All right.

3

Q. -- that this dosage an hour

4

before killed the baby?

5

A. Right.

6

Q. All right. So, you would have

7

expected digoxin to be found in that range. Well,

8

the fatal range we know from our reading is 108 to
1240, according to the literature, isn't it?

9

A. Those are concentrations that

10

have been measured in tissue in individuals who have

11

been known or thought to have died with digoxin

12

intoxication, yes.

13

Q. Yes. And that is what you

14

are positing about this baby?

15

A. Yes.

16

Q. Yes. So, I suggest to you that

17

you would have expected if you could have done the

18

momentary test I have described with accuracy, a level
of 100?

19

A. Well, again, I don't agree

20

with you because I don't think I am communicating to

21

you my reservation about that. I don't think I have

22

successfully got the concept across.

23

Q. Well, try me again. As I

24

warned you, I am very slow.

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K8

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A. One of the problems with me explaining this to you is that we are dealing with a bunch of assumptions here that may or may not be true --

Q. Exactly.

A. -- in terms of what happened before this so-called large dose might have been given. So, I am struggling with trying to keep the assumptions in mind that I really don't believe, but anyway --

THE COMMISSIONER: Well, don't do that. I don't think you have to do that. I think what you have to do is just take those that we know, the reading and the dose at 9 o'clock.

THE WITNESS: Okay.

MR. SCOTT: Q. Have I given you any assumption in the little example that I gave that you don't believe?

A. We have to assume what existed before this possible large dose.

Q. Yes.

A. Because that depends a lot on how I answer your question about possible concentration range.

Q. And the question that is there to be debated is whether the mother had properly given the baby digoxin at home or not?



K9

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A. Right.

3

Q. Okay. So, at that point you

4

have opened up two possibilities: That the mother

5

did the job or that the mother didn't do the job?

6

A. Right.

7

Q. Okay. And that produces two

answers.

8

A. Could we isolate that now?

9

Q. Yes, by all means.

10

A. Let's assume, first of all,

11

that the mother did her job.

12

Q. Yes.

13

A. That the baby came in with a

14

digoxin concentration really in her heart of, let's
say, 45 or 50, whatever.

15

Q. Yes.

16

A. Let's put it at the low end

17

of the so-called therapeutic range.

18

Q. Yes.

19

A. Which is not inconsistent with

20

fixed tissues maybe being 6 or 7, you know, we don't

21

know how much leaches out or breaks down or whatever

22

happens to it. Let's say it was really that and let's

23

say that that was all equilibrated within the heart

24

muscle, there was an equilibrium, that's steady state,

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K10

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between the specific binding sites and the non-specifically bound or dissolved drug, whatever is existing in there.

Q. Right.

A. And we know that the proportion of the total digoxin that is specifically bound is quite small compared to the total amount in the tissue.

Q. Yes.

A. So, let's say now she gets a large bolus. If we measure the total concentration, we may not see any significant change; we might see some, we may not. But all I'm suggesting to you is that as that bolus comes to the heart and you increase momentarily or over a short period of time the specific binding to cell receptors you can produce toxicity.

Q. All right.

A. And in the infants that have been treated or in adults too that have been reported over the last couple of years treated with FAB antibodies, when the antibodies suck the digoxin out of the tissues, the serum concentration goes up four, five, sixfold.

Q. Well, let me ask you, in that



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scenario when the bolus works to the heart and toxicity occurs, what level would you anticipate in the heart?

A. That is what I just told you. I think the total concentration may or may not change.

Q. From what?

A. From the --

Q. 49?

A. From the background level that existed, whatever it was.

Q. And the background level might be anywhere between 49 and 900?

A. And if she wasn't taking her medicine, it might be 4.

Q. Yes.

A. But what I am saying is what we can't measure is what the concentration is at the receptor and that's what could have changed acutely and caused a change in cell function and toxicity.

Q. Yes, all right.

A. Have I explained what I'm getting at?

Q. Well I think I understand. But when I put this conundrum to you that the reading in the tissue post mortem is only 4 and the reading in



K12

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the other tissues is very low, I take it the problem I haven't confronted is that that is a fixed tissue sample?

5

6

A. Well, we have taken that into consideration, haven't we?

7

8

9

Q. Well, the problem I put to you is that the serum level is very high, the tissue level is very low, the tissue level, if accurate, is probably not enough to kill, is it, if accurate?

10

11

12

A. If it was accurate.

Q. Yes, and you told me and I have no doubt you are right --

13

14

A. Now, wait a minute. No, I don't agree with what you have just said.

15

16

Q. All right.

A. For the reasons I have tried to explain to you.

17

18

Q. All right. So that this baby could have died with a cardiac level of 4?

19

20

21

22

A. I think it is unlikely but he could certainly die with a myocardial level of 10 or 20 or 30 under acute situations with no digoxin having been there or insignificant amounts prior to that bolus.

23

24

25

Q. Well, that would be totally



1
K13 2 out of touch with the literature which describes the
3 starting level at 108.

4 A. No.

5 Q. Have I misread that?
6 I thought that that was one of the first things you
7 told us the other day:

8 "The range of concentrations reported
9 in cases of fatal poisoning..."

10 This is what Mr. Cimbura said and I thought you
11 agreed with it:

12 "...is 108 to 1,240 nanograms."

13 A. Right.

14 Q. Yes. Are you telling me that
15 a concentration in the heart of as little as 10 can
16 nonetheless produce a fatal poisoning?

17 A. I don't know that it could but
18 I think it is possible. The problem with the ranges
19 that are in the literature is that they are taken
20 at different times under different conditions in
21 different kinds of tissue. You see, that's the
22 problem.

23 Q. I too accept that it is
24 possible and agree with what you earlier said, that
25 everything is possible. But what I am suggesting to
you is that when we have literature that establishes --
you know, the literature may be exceptional, what have
you, but when we have literature that establishes that



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the fatal range is 108 to 1,240, can we not say that
in the ordinary case it is likely that the range in the
heart of a child who has been killed by digoxin at
the moment of toxicity is probably 108?



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A. Well, I am not sure I can go

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that far.

4

Q. So you --

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A. I think it is most likely if

6

an individual died of digoxin toxicity and lived for
a while, I am talking about hours, after the dose

7

was given so there is some distribution takes place,

8

I think you are right, I accept those numbers.

9

Q. Yes.

10

A. I don't think we know what the

11

tissue level might be in the kind of situation I am

12

postulating in this case.

13

Q. Well, I take it it wouldn't be

14

4, that would be most unlikely?

15

A. I think that is quite unlikely,

16

yes.

17

Q. And when I confront you with

18

4 you very wisely say, well that is a fixed tissue
sample and you have to account for leaching.

19

A. It wasn't in the heart.

20

Q. I am sorry, wasn't it?

21

A. I think the heart level - I

22

don't think there is a significant difference, I think
the heart level was 5, 6 or 7, something like this.

23

Q. Well I am sorry, I didn't want -

24

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L.2

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I am sorry, 5 and 7.

Q I don't really think there is a significant difference.

MR. STRATHY: I am sorry, Mr. Scott, with your leave, really what it is, it is not even 5 and 7 because those are digoxin and digoxinlike substances. All Exhibit 95 refers to is traces.

MR. SCOTT: Well, we will leave that possibility of digoxinlike substances to be dealt with elsewhere.

Q 5 and 7, you are quite right. What you have explained to me is that you have to take account of the problem of leaching?

A. True.

Q Well, if you look at Mr. Cimbura's sheet, page 5, he says:

"Fluid surrounding the tissue -- ".

MR. HUNT: I am sorry, what exhibit number is that?

MR. SCOTT: I am sorry, 95.

MS. CRONK: A.

MR. SCOTT: Exhibit 95A.

MR. HUNT: Thank you.

MR. SCOTT: Q "Fluid surrounding the tissue, the fluid is reported to be



L.3

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"Klotz fixative solution. The fluid
was found to contain 4."

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A. That is correct.

5

Q Well, doesn't that suggest,

6

even accounting for leaching, the tissue level was not
markedly different than 5 or 7?

7

A. No.

8

Q What does that suggest to you?

9

A. It suggests that whatever came

10

out of the heart into that volume of Klotz solution
produced a concentration of 4-1/2 grams per millilitre,
it gives you no quantitative estimate for digoxin at
all.

11

12

13

14

Q All right. Have I got - just

15

because I want to be sure I have it to ask others
about, that it is your view that a level of as low as
10 in the heart of Allana Miller could have been the
cause of her death?

16

17

18

A. I don't want to get hung up

19

on a specific number. I think a relatively low number,
and probably a fresh tissue concentration lower than
what we would see in a normal digitalized patient
could have produced lethal toxicity with a sudden
bolus, if that is responsive to your question.

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22

23

Q So I take it that the conundrum

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I present simply presents no problems to you at all?

A. Which conundrum?

Q. The conundrum of high serum
levels and low tissue levels?

A. No, it is not a major problem
to me in trying to put things together. It is a
problem, because the tissue levels are a real problem
because of the vagaries inherent in them. If we
assume that the tissue levels were quite low, whatever
low is and she had a high serum concentration, it
doesn't bother me in terms of trying to explain her
death and relating it to a digoxin overdose.

Q. And when confronted between
two possibilities; the possibility of a bolus shortly
before death, and the possibility that the mother was
not administering the digoxin at home, you selected
the first possibility?

A. Now, wait a minute, I didn't
think those possibilities were opposites.

Q. Well, are they opposites, or
are they not?

A. If I had to put the whole
picture together --

Q. Yes.

A. -- in my own mind, I would



L.5

1
2 include both of those I think, if I understand you.
3 I would suggest that the baby was prescribed a
4 maintenance dose at home over those months prior to
5 her admission; that she had not received all of her
6 maintenance doses for whatever reasons, maybe she
7 vomited it, I don't know. But she came into the
8 Hospital with tissue levels that were lower than
9 you would usually expect in a digitalized child. Then
10 she received a maintenance dose, one maintenance
11 dose in the Hospital that evening. I don't think any
12 others prior to her death, because it was held on the
13 20th, and so she didn't receive any subsequent doses,
14 so it was 36 to 48 hours before her death that she
15 received that maintenance dose, and then she could
16 have been given a large --

15 Q You have included the one she
16 got at 9 o'clock, that is six hours before her death,
17 we know she got that, or it is recorded?

18 A Now, let us look at the chart,
19 where is that?

20 Q This is at page 38. She died
21 in the early morning, I think 4 o'clock or something
22 like that, on the 21st, and she got an oral
23 administration at 9 o'clock the previous night.

24 A Where is that charted?
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L.6

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Q. It is at page 38 of the Miller chart.

A. I am looking at page 38.

Q. It is at the bottom of the page.

A. Yes.

Q. Do you see it?

A. Yes.

Q. Have I read that right?

A. No. Well she didn't, according to the way I am reading the chart she did not receive a dose at 0900.

Q. 2100 hours, I am sorry, I have turned that into 9 o'clock.

A. I am sorry, yes, 9 o'clock, 9 p.m. As I read it that is the only dose that she received and that is the one I was referring to.

Q. That was six and a half hours before her death?

A. Yes, my error was I was saying it was the evening of the date of admission, it was the following day. She didn't receive any the day of admission, she received this dose at 9 p.m. on the 20th, six hours prior to her, approximately six hours prior to her death, right?

Q. Yes.



L.7

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A. So continuing with my scenario, she received that, and I am assuming it was an ordered maintenance dose correctly given?

Q. Yes.

A. Then my hypothesis to put this whole thing together is, that then she received a bolus some time shortly prior to her death which contributed to her terminal arrhythmia.

Q. And is it an essential part of that scenario that the baby was not properly or adequately digitalized at home?

A. No.

Q. Or was not receiving --

A. I don't know if it was essential but it is the most plausible way I know of explaining her low concentration in serum when she was admitted and the low tissue concentration in the fixed tissues.

Q. Yes.

A. None of it hangs together real well.

Q. That is what I am getting at. I mean, we are talking, Doctor, I don't want to demean the exercise at all, but we are talking a highly speculative exercise, aren't we?



L.8

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A. We are talking a speculative
exercise in her as well as the others.

4

Q. Oh, yes.

5

6

A. And looking for what could be
the most plausible explanation for the whole picture,
I agree with you.

7

8

9

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11

12

Q. Yes. And what is plausible
one day turns out to be implausible the next day when
a new fact is discovered, we only have to look at
Estrella and your very candid observation that you
moved Estrella from 5 to 2 when a new fact comes to
light?

13

A. That's right.

14

15

Q. And that is the exercise in
which we are engaged as life is imposed on us.

16

17

Okay, now let me just see where this
hypothesis leads. You have to posit a bolus an hour
before the child's death to explain the serum level?

18

19

A. Yes. I had no reason not to
assume the level was there.

20

21

22

23

24

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Q. What I am suggesting to you
as a possibility, you don't put these things any
higher necessarily, neither do I. What I suggest to
you as a possibility is that the serum level is a
function of the fact that the administered dose at



L.9

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2100 had not moved through the tissues, isn't that
a possibility?

3

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A. With the vagary of that level,
and not knowing whether it was 7 or 70, I think it is
even easier to explain it if we say that we didn't
have that high level and her tissue level was low
then it all hangs together much better.

8

9

10

11

Q. Yes, but we have two hypotheses
which in the state of knowledge can both be held by
persons of experience, and one opts for one and one
opts for the other, isn't that the situation in which --

12

13

A. With Estrella you pick your
assumptions and make your choices.

14

15

16

Q. Exactly, and it is the same
with Miller, isn't it?

17

18

A. I would have to look at Miller
and compare them.

19

20

A. All of them have some - have
very inadequate data to make a definitive decision, yes.

21

22

Q. Exactly, and I think you put
it as graphically as anybody has in this hearing, you
pick your assumptions and you make your choices?

23

24

A. I think you have to say that,
yes.

25



L.10

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Q. Well now, that isn't the end of my problems, I have got some more that I want to confront you about that I don't understand. The first is about half lives.

A. Is this in this patient or shall I put the chart --

Q. No, this is generally, I can't even get to a patient until I understand this.

A. Okay.

Q. And as I understand the evidence we have heard so far is, that once you are at a steady state, the half life of digoxin in serum varies between 27.9 hours and 48 hours roughly in Ox. and Griffiths abstract and so on give those figures.

A. Well the variation in infants and patients is even greater than that if you look at all the literature. I mean you can find numbers anywhere from 15 to 80 I think or in those ball parks.

THE COMMISSIONER: This is in what we call the beta phase?

THE WITNESS: I am assuming you are referring to the elimination half life which would be the beta phase.

MR. SCOTT: Q. That is right, yes. But would it be fair to say that we are talking about



L.11

1

2

half lives of what range, in serum?

3

A. Well, as I say the range, the

4

extreme range that I have seen in babies is --

5

Q. In serum.

6

A. In serum 15 to 16 hours to

7

somewhere in the area of 70 hours, I can't remember exactly the upper range.

8

Q. So that is the range. Then

9

when you come to half life in tissue, heart muscle

10

has been observed at half lives of three and a half

11

days, isn't that so?

12

A. That is correct, that is what

13

I pointed out the other day.

14

Q. I think you also said, perhaps

15

I am wrong, that the right atrial appendage four and a half days?

16

A. That particular study, the

17

estimated half life in ventricular and atrial appendage

18

were a little different; but the authors pointed out

19

they were not statistically significantly different.

20

Q. Just so we will know where to

21

find it when you go back to Detroit, this is in the Griffiths study.

22

A. Right, I have it, since I

23

brought it with me.

24

25



L.12

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Q. But you have to leave us some way to find it.

I take it that the point you made is that we don't know where on that scale half lives in other tissues, liver, fat, brain, skin and so on may fall, am I right?

A. We have no information one way or the other.

Q. We may know next year or two years down the line but we don't know now, right?

A. I would agree with that, yes.

Q. Now, the next factor I think I understand from the evidence you gave at the Murphy inquest is that after the steady state is reached, and we are speaking in general terms, only 5 per cent of digoxin by volume is in the serum and 95 per cent is in the tissues?

A. I think I said 0.5 per cent if I recall correctly.

Q. You are absolutely right, I read it wrong. The balance, 99.5 per cent is in the tissues.

A. 99.5 per cent, correct.

Q. Now what I don't understand is how the half life process works. Let me see, just



L.13

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see if I can explain the problem. In serum you have a range of anywhere from 15 to 60-70 hours for a half life. So I can understand half life in serum, let us assume a baby with a serum half life of 30 hours, I would understand that if there was digoxin in the serum after 30 hours there is half the volume that there was before; after the next 30 hours there is half of what was left and so on, I have got that right, haven't I?

A. Yes, I think --

Q. Okay, now bearing in mind that 99 per cent of the volume of digoxin is in the tissues, and the half life in the tissues moves the digoxin from the tissues into the serum, have I got that right?

A. Well, it isn't a half life, it is some sort of equilibrium - obtains.

Q. Yes. Well, how do the half lives work in the face of that reality? In other words, you tell us that the half lives in the serum decrease the volume by half depending on what the figure for the half life is, but we know on the other hand that the volume in the serum is increasing at the very same time because of the half life factor working on the tissues.



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A. Say that again?

3

Q. Well, if we were dealing only

4

with serum --

5

A. All right.

6

Q. -- I would understand the

7

proposition that after a 30-hour half life you had
half the serum volume of digoxin.

8

A. Half the serum concentration.

9

Q. Half the serum concentration

10

in serum.

11

A. All right.

12

Q. So if you had a concentration

13

in serum of 50 after 30 hours you might have a serum
concentration of 25?

14

A. Right.

15

Q. Okay. But what is happening at

16

the same time as that is happening is the half life

17

principle is working on the tissues and moving half

18

the volume in the tissues into the serum?

19

A. No.

20

Q. No?

21

A. No.

22

Q. All right. That is my problem.

23

A. Okay.

24

Q. Because I understood you to say

25



M2

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2

to the Judge yesterday that the digoxin in the
tissues --

3

4

MR. HUNT: Sorry, where is the
reference to that?

5

6

MR. SCOTT: It is yesterday.

7

MR. HUNT: That doesn't help me.

8

MR. SCOTT: Weren't you here yester-
day?

9

MR. HUNT: Yes, I was.

10

THE COMMISSIONER: I was but --

11

MR. SCOTT: I'm not going to stop
to look it up for Mr. Hunt but I will try to find it
for you over lunch.

12

13

MR. HUNT: If my friend is going to
put a suggestion that he said something --

14

15

MR. SCOTT: Well, it may not --

16

THE COMMISSIONER: It might not be
any problem because with this witness at any rate he
will probably put it straight.

17

18

MR. SCOTT: Well, Mr. Commissioner,
just let me record the matter.

19

20

I recall you yesterday raising with
the witness --

21

22

THE COMMISSIONER: I recall the
question. I can't remember the answer.

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M3

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MR. SCOTT: -- raising with the witness the question of whether digoxin given off by the tissues had to go via the serum before it is expunged from the body. I don't know if you recall that, sir --

THE COMMISSIONER: Yes, I certainly recall the question and I wish I could recall the answer as well as questions.

MR. SCOTT: Q. Well, what was your answer to that problem?

A. To the question as to whether it has to go to the serum before it is excreted?

Q. Yes.

A. Yes, it does have to go into the serum before it is excreted.

Q. Okay. So do I then have it right that the digoxin given off by the tissues finds its way into the serum?

A. That is correct.

Q. All right. So that when digoxin given off let's say by the muscles or the lungs or something is given off after the first half life, does it then go into the serum?

A. The digoxin leaves the tissues, it goes into the serum.

Q. Does that process increase the



M4

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2

volume of digoxin in the serum?

3

A. Will it increase the amount,

4

the --

5

Q. The amount, yes.

6

A. -- the concentration, no,

7

because the digoxin that goes into the serum moves

8

along a concentration gradient to maintain a distribu-
tion proportionality.

9

I think I understand what your

10

conceptual problem is, and I need to give you an

11

hour lecture on --

12

Q. No, I don't --

13

A. -- three-compartment pharmaco-

14

kinetics to address that.

15

THE COMMISSIONER: Well, I don't know

16

that we have to have that, but what Mr. Scott's

17

concern is that you have a half life where it is

18

getting out of the serum into the tissues but in order

19

to get out into the outside world it has to come

20

back into the serum. Why doesn't that affect the

21

half life of --

MR. SCOTT: Q. Why doesn't it affect

22

the volume in the serum?

23

A. Not volume. Don't say volume.

24

Q. Sorry.

25



1
M5 2 A. It is the amount in the serum.

3 Q. It does affect the volume,
4 doesn't it?

5 A. No, it doesn't affect the
6 volume of anything.

7 THE COMMISSIONER: Amount is
8 apparently a better word.

9 MR. TOBIAS: Perhaps you should stop
10 while you are ahead, Mr. Scott.

11 MR. SCOTT: I am not sure I am
12 ahead. If I am not ahead it is a bad time to give up.

13 THE WITNESS: I have got a graph of
14 concentrations along time, the log of the concentra-
15 tions, sampling of serum; you can see everything at
16 any concentration of serum with time after an intra-
17 venous dose. It is going to be very high to begin
18 with and transiently it falls very rapidly; it comes
19 around like this; comes down about like this (indicates).

20 Now if we describe this mathematically,
21 we are going to have a series of exponential functions
22 that will describe apparent slope here, apparent slope
23 here, apparent slope here, apparent slope here,
24 apparent slope here and another apparent slope out
25 here. This probably represents nature. When we talk
about half lives we tremendously oversimplify what



M6

1
2 actually exists in nature so we deal with distortion.

3 Now lets say that this is -- I don't
4 want you to get hung up on the time number but I am
5 just trying to make a point. Let's make this 20
6 days after. So this is 10 days, 15 days, 5 days.

7 So if somebody does a study of
8 digoxin the way most of the serum kinetics have been
9 done and they measure the half life, the sample, the
10 concentration serum after dose of about 48 to 72
11 hours. That is out to here, and they measure this
12 slope, and they say that slope is equivalent to 30
13 hours, half life 30 hours, and when it gets -- when
14 the concentration gets down to this level, their
15 assay doesn't allow them to measure any more so all
16 this literature is published with 30 hour half lives,
17 20, whatever you said, 20 some to 60 some half life.
18 They measure this slope. We know there is a fast one
19 here, an alpha phase we call it, let's say this is
20 the beta phase.

21 We have never looked at this --
22 deep compartments they are called. If we could measure
23 these extremely low concentrations, we might be able
24 to describe a half life up here of 45 days and I don't
25 know if it exists but conceivably even longer out here.

Now what is actually happening in the



M7

1
2 tissue is when we see this there is a tissue compart-
3 ment that would reflect if we measured it a 30 hour
4 half life. There is a more tightly bound digoxin
5 that probably includes that exactly that probably
6 has a half life longer than that. But we don't measure
7 it in the serum because we can't. So these people
8 finally tried to do that in serum and because the
9 concentrations are so much higher in serum they can
10 technically measure it and they can describe this
11 longer half life. To me that explains the dilemma
that you are dealing with.

12 It is not a problem for me because I
13 think I understand what is happening but it is
14 certainly confusing and I can see how it would be
extremely confusing --

15 Q. Well, I am doing my best to
16 look as if I understand, but that is as far as I can
17 go at the moment. But is this your opinion on the
18 question that the volumes -- I know you dislike the
19 word so I will leave it out.

20 A. Well, it is a misnomer, that is
21 why I don't like it.

22 Q. Digoxin being given off by the
23 tissues into the serum does not affect the serum
24 levels for digoxin?
25



M8

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2 A. It does because it affects the
3 rate of decline of the serum level at that moment in
4 time.

5 THE COMMISSIONER: What you are
6 really saying is that the half life of the serum takes
7 into consideration the fact that some of the digoxin
8 is coming out of the tissues into the serum?

9 THE WITNESS: That is where it comes
10 from, all of it, eventually.

11 THE COMMISSIONER: But when you are --

12 THE WITNESS: You see you are thinking
13 in absolute quantities instead of rates and rate
14 constants, and I think that is part of your problem.

15 MR. SCOTT: Q. Let me put this
16 problem to you: You have baby or an adult that has
17 received digoxin for a period of weeks and has been
18 on a maintenancè dose. You have told us that in
19 steady state 99% of the digoxin will be in tissue.
20 You have told us that that digoxin will be given off
21 in this fashion, half the volume at these intervals.

22 A. At a rate -- if you don't give
23 them any more, there is a rate at which it will
24 decline in the tissues.

25 Q. Right. And the rate for
tissues in those cases where it is known, that is
heart, may run three and a half to four days, four and



M9

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a half days?

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A. These were adult patients undergoing surgery and that is the best information we have.

6

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Q. All right. So that if you take a baby who has been on digoxin therapy and the digoxin therapy ceases at the end of let's say Day 10, on Day 11, 12 and 13 digoxin will still be given off into the serum from the tissues on the half life principle. Is that right?

11

12

13

14

A. I think it is easier -- it might be easier for you if you thought about the rate at which the drug leaves the body rather than getting tied up --

15

16

17

Q. Well, let me see if I can just follow one thing. The half life theory means essentially for practical purposes that after five half lives we are down to minute quantities?

18

19

A. That is true if you are looking at half life of the drug leaving the body.

20

21

22

You see one of the problems is we have introduced an artefact conceptually into pharmacokinetics by having to measure the drug in serum because that is what is available to us.

23

24

25

Q. Right.



M10

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2 A. And what the pharmacokineticists
3 have done is they have said the way you really ought
4 to be looking at this is the rate at which the drug
5 leaves the body. But the way we are going to describe
6 that is we are going to measure it in serum and we
7 are going to try to relate the serum concentrations
8 to the amount of drug in the body.

9 So your problem is really built
10 around the artefact that has developed conceptually
11 because of the technical limitations that are placed
12 upon it by not being able to sample the drug in
13 tissues with time.

14 Q. Well, I take it that the Ochs
15 paper tells us that after six days 40% is still in
16 the body?

17 A. Well, let me comment on the
18 Ochs paper. That is a classical controlled pharmaco-
19 kinetics single-dose pharmacokinetic study done in
20 normal young adult volunteer males. It is based on
21 serum concentrations and urine collections.

22 What they did, they gave a single
23 intravenous dose and they collected all the urine,
24 if I remember correctly, for 72 hours. Is that
25 correct?

Q. I am not certain.



M11 2

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MS. CRONK: Put the paper in front
of the witness.

4 MR. SCOTT: Q. You see, doctor, the
5 problem which confronts me --

6 MR. HUNT: Mr. Commissioner --

7 THE WITNESS: Well, wait a minute.
8 This is important, though.

9 MR. SCOTT: Before Mr. Hunt sits
10 down let me tell you the question he wanted to find
is at page 5635. Perhaps he will look it up.

11 MR. HUNT: Thank you very much.

12 THE COMMISSIONER: I wonder, doctor,
13 clearly if we are going to get into this Ochs paper
14 we are going to run past the ordinary time for our
break.

15 I would like you -- I don't want to
16 interrupt -- I don't want to go into the Ochs paper
17 now; we can go into it after 2:30, but if there is
18 a question or two you want to ask or would you rather
19 hold all of that and --

20 MR. SCOTT: I would rather come back
21 earlier if you want to. I don't want you to sit
22 after five o'clock and I don't want you to sit at
8:30 in the morning but I don't mind --

23 THE COMMISSIONER: You don't mind if
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25



M12

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I have a short lunch.

MR. SCOTT: -- a short lunch.

THE COMMISSIONER: I didn't get to
this size by having a short lunch!

MR. SCOTT: Under my regime I have
left plenty of time for elaborate breakfasts and
dinner.

THE COMMISSIONER: Well, will it
be all right with you if we break now until 2:30?

MR. SCOTT: Yes.

THE COMMISSIONER: All right.
--- luncheon recess.



AA
BB/cr

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2 ---On resuming.

3 THE COMMISSIONER: Yes, Miss Cronk.

4 MS. CRONK: Just before Mr. Scott
5 continues I am obviously concerned about some
6 scheduling difficulties. Mr. Scott's best estimate,
7 to which he should not be held in any way at the
8 moment, is an hour; Mr. Ortved a half an hour and
9 Miss Symes is an hour and a half.

10 I have explained the scheduling
11 difficulties to Dr. Kauffman. His preference,
12 subject to your own views, is that we sit even if
13 there is a reasonable possibility that we will have
14 to ask him to return at a later date to complete
15 his evidence, that we do sit tomorrow and accomplish
16 as much as we possibly can. The difficulty is that,
17 despite the best and courteous efforts of the
18 Doctor, it may be next to impossible for him to
19 come back before Christmas.

20 My recommendation to you under the
21 circumstances, sir, is that we plan as we originally
22 did to sit tomorrow and accomplish as much as we
23 can but I think there is a very real possibility
24 the Doctor's evidence will not be completed by
25 5 o'clock tomorrow night.

THE COMMISSIONER: After that note of



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gloom, Mr. Scott.

3

MR. SCOTT: So, it's all on me, is

4

it?

5

THE COMMISSIONER: It's all your fault,

6

yes.

7

MR. SCOTT: Fine.

8

THE COMMISSIONER: No, I think what

9

we will do is we will carry on and I think we may

10

sit a little on the late side tonight; not a great

deal on the late side but a little, a little.

11

MR. SCOTT: Q. Doctor, before we

12

get into an analysis of the Ochs paper, which I hope

13

I can avoid, let me just see if I can put again

the proposition I was trying lamely to make.

14

The half life in serum you put on

15

the basis of the studies we have at about 36 hours.

16

A. That's a mid range of what

17

had been reported, yes.

18

Q. The reported half life in

19

tissue is either three and a half or four and a half
days?

20

A. Yes. I should say it this

21

way, I suppose that the kind of data that is, does

22

not have the confidence level that the serum data

23

is simply because, well, for several reasons: one,

24

25



1
2 the way it has to be collected because of the nature
3 of the data and also it is the only one, only study
4 where we have a lot of serum studies to compare.

5 Q. So, the confidence level with
6 the serum study half life is better, is that what
7 you are saying?

8 A. I think, simply because we
9 have more samples and we have more studies.

10 Q. Well, I understand that.

11 A. Yes.

12 Q. So that the half life time
13 for tissue may be higher than four and a half days
14 as well as lower. We simply don't know.

15 A. I think when more information
16 is available that's what I would expect. The other
17 thing we have to remember ---

18 Q. Higher?

19 A. No, it is probably going to
20 scatter on either side.

21 Q. Sure.

22 A. I don't know where in the
23 range of this possibility one study lies. The
24 other thing I think we have to remember is that,
25 as you may have pointed out earlier, different
tissues have different affinities for digoxin.



1
2 So, different parts of the slope of this curve in
3 this serum may represent different proportional
4 contributions at different points in time from
5 different tissues.

6 Q. You see, it is just as
7 significant for me to highlight what we know as
8 what we don't know. You have told us that the
9 confidence level that you have in the serum half
10 life and what I am saying to you is that when we
11 come to the tissue half life the one study we have
12 shows three and a half to four and a half days in
certain tissues?

13 A. In myocardial tissues.

14 Q. Yes. We don't have any
15 assistance from any studies as to what the half
life is in a whole lot of other tissues?

16 A. That is correct.

17 Q. It may be longer, it may
18 be shorter.

19 A. I think that is fair to say.

20 Q. And you have made the point
21 that even with respect to heart tissues the
22 confidence level because the studies are fewer is
23 not as great and we may have longer half lives or
24 shorter half lives, we simply don't know yet.
25



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A. I think that is fair to say,
yes.

4

5

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Q. And it is not the only field
in which we have some ignorance but that is what
we have to work with.

7

8

9

10

11

12

13

A. That's right.

Q. Now, all I am saying to you
is that, bearing in mind that 99 per cent of the
digoxin is in tissues, there is at least a sig-
nificant possibility that there will be measurable
quantities of digoxin in tissues, four and a half,
five and a half, six and a half, seven and a half
days, perhaps longer, after the last administration?

14

15

16

17

A. It depends on, as you have
said, the half life and it depends on whether it
is measurable or not, it depends on how much was
there when you began and how sensitive your
analytical method is.

18

19

20

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Q. And it therefore follows
that you are in no position to say, except as a
matter of possibilities, that there may be
measurable quantities of digoxin, say, 25 days
after the last administration, based on the hard
knowledge we have - some hypothesis we can all
develop - but based on the hard knowledge we have



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that's quite possible, isn't it?

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A. I don't think I would go so far based on what we know now with saying it is quite possible. I think it is possible but somewhat unlikely is the way I would state it.

7

8

Q. You wouldn't be surprised if a subsequent study showed that?

9

10

A. If it showed it I could certainly accept it. Based on what I know now, I wouldn't predict it as being a common phenomenon.

11

12

13

Q. Well, what I am suggesting to you is, let's be frank, we don't know anything now that makes that more or less probable, do we?

14

15

A. No, I don't think we have enough information, no.

16

17

Q. Exactly. Well then, we don't have to be so categorical about it being not likely, we simply don't know. Isn't that fair?

18

19

20

A. 25 days?

Q. Yes. 20 days, 15 days, 27 days, we don't know.

21

22

A. Well, if we accept the half life of four hours in myocardium.

23

24

25

Q. Of four days?

A. Of four days, I am sorry.



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Q. Yes, but you have said that
might be longer too?

3

4

A. It may be, it may be shorter.
That's what we have to work with.

5

6

Q. You see, Doctor.

7

MS. CRONK: Let him finish.

8

MR. SCOTT: I beg your pardon?

9

MR. HUNT: Let him finish.

10

MS. CRONK: I am sorry.

11

MR. HUNT: Miss Cronk's comment was
let him finish.

12

MR. SCOTT: Yes, I am sorry, go ahead,
Doctor.

13

14

A. What I was going to say is,
if we accept what we know a half life of
approximately four days and we say that essentially
all the digoxin that was there when you began it
began declining is gone in five half lives, that's
20 days.

15

16

17

18

19

So, based on what I know I really
have to use that as my outside number at the present
time. If I learn something different in the
future then I will revise that.

20

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22

23

Q. Okay. So, you put 20 days
as your outside number on the basis of what you now

24

25



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know?

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A. Well, that's saying that there could still be traces present. I don't know if it would be detectable or not, it depends on how much was there to begin with and how sensitive an analytical method was available to look at it and how much tissue you had to extract it from.

Q. Now, in the Ochs paper, I don't know whether the Ochs paper is right or wrong, and you are quite right they were dealing with adults, healthy males I think in their twenties and early thirties.

THE COMMISSIONER: What's the number of the Ochs paper ?

MR. SCOTT: Exhibit 254.

Q. You don't need their ages but they seem to run from a young of 25 to an old of 37.

A. I would like to look at the paper if you are going to discuss it, please.

Q. Sure. I am not going to discuss it but you can certainly look at it. All I am saying to you is that Ochstell tells us that in that sample group 40 per cent of the digoxin remained in the body some six days after the administration?



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2

A. Well, we are going to discuss
it because that isn't what the paper says to me.

3

4

Q. Oh, I am sorry, I thought it
was. What does the paper say?

5

6

A. What they apparently did, as
I read the results section is that they did collect
urine for six days after the start of the infusion
and they collected it in 24 hour intervals for six
days and they measured digoxin in the urine by
radioimmunoassay.

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Q. Yes.

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A. And they found the cumulative
excretion by six days of digoxin measured by radio-
immunoassay was 60 to 70 per cent of the
administration dose, depending on the dose.

14

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Q. Yes.

16

17

A. That leaves somewhere between
30 to 40 per cent of the dose that they didn't
account for.

18

19

Q. Yes.

20

21

A. What they didn't account for
is the quantity of digoxin that was given by that
single dose that was metabolized by the liver which
they didn't measure and came out in both the bile
and the urine.

22

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Q. Well, how do you know that?

3

A. Because it has been demonstrated

4

in the past that not all digoxin comes out in the

5

urine as unchanged drug, a little bit of it is

6

metabolized and the estimates are anywhere from

7

5 to 30 per cent. So, if you don't measure the

8

metabolites you don't account for the total dose.

9

Q. No, but are you saying that
the balance of 30 to 40 per cent would have come out
in that fashion?

10

11

A. I am suggesting it well may
have, yes.

12

13

Q. All right.

14

A. And they didn't measure that,
so, they couldn't account for that.

15

16

Q. So, you categorically reject
any conclusion of the type I am purporting to draw
or that Dr. MacLeod drew from this paper?

17

18

A. I am not sure what point you
are making. I am just commenting on my interpretation
of this paper.

20

21

Q. Do you know Dr. MacLeod?

22

A. Yes, I do.

23

Q. Yes. He did the following
exercise. He applied that finding to children, and

24

25

AA
BB/cr



1
2 there may be some question about that, but that's
3 what he did, he extrapolated from this to children
4 and then he concluded that on the basis of that
5 paper there was a possibility that up to 40 per cent
6 of the digoxin would remain after six days. Now,
7 that is a hypothesis that he advanced. He didn't
8 assert that it was categorically the case. Do you
9 categorically reject it?

10 MR. HUNT: Well, if my friend is
11 going to put Dr. MacLeod's hypothesis to the
12 witness then I think the witness should have the
13 opportunity to read what Dr. MacLeod said and he
14 may add any qualifications he has before he comments
15 on it.

16 MR. SCOTT: Here's what he says at
17 page 4275.

18 A. Can I follow with you, please.

19 Q. Yes.

20 A. If there is another copy I
21 can just look at that while you read it.

22 MS. CRONK: Volume?

23 MR. SCOTT: Volume 64. Well, actually,
24 if you begin at 4274 at line 14 Mr. Lamek is
25 examining.

MR. HUNT: It actually begins at



1

2

4273 I think about line 6.

3

MR. SCOTT: All right, 4273.

4

"A. The point that I wanted to

5

make with this paper..." and he was

6

referring to Ochs.

7

"...was that, once digoxin is

8

administered in a therapeutic dose

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or in a super-therapeutic dose, it

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is bound in a variety of tissues and

11

simply will not disappear from those

12

tissues within a predictable time

13

frame. All the times that you have

14

heard in this hearing refer to

15

disappearance from serum or dis-

16

appearance from the plasma space,

17

and that is a different animal than

18

talking about disappearance from

19

tissues.

20

Q. Let us be clear on that, Dr.

21

MacLeod, because I confess it is a

22

matter about which I am totally

23

confused."

24

That is an admission from Mr. Lamek

25

I am going to note.

MS. CRONK: Past tense, was.



1

2

MR. SCOTT: All right.

3

"No doubt the confusion was mine

4

alone and everyone else understands

5

it. But let me be clear that I understand it.

6

We have heard about elimination half

7

life and we have been told that that

8

can be a period of anything from 20

9

to 80 hours and, in the course of

10

five of those half lives of whatever

11

length they may be, you will have

12

essentially eliminated whatever it

13

is - 97 per cent or 99 per cent - of the digoxin.

14

You are telling us, as I understand

15

it, that that refers only to the

16

elimination of digoxin from the

17

circulatory system?

18

A. That is correct.

19

Q. And does not by any means

20

indicate that digoxin which had been

21

administered and which is bound to

22

tissue is also being eliminated at

23

the same pace, if at all?

24

A. You are correct. That

25



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2

"inference cannot be made.

3

Q. Okay. Therefore, let us take
a child who is on a regime of
digoxin; if the last prescribed dose
were a week before the time at which
we take a level, we may find nothing
in blood but that would not necessarily
mean that there may not be still
digoxin bound to tissue.

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Would it be pharmacologically active
still?

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12

A. I can't say that but your
expectation would be that there would
be digoxin remaining in tissue a week
after the last dose of digoxin?

13

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16

Q. And indeed for, I take it,
a possibly very much longer period than
a week.

17

18

19

A. I think it is impossible to say
what the actual duration would be
under which the drug remained in the
tissue. Clearly, there is some
digoxin that is very tightly bound
in tissues, to receptors. There is
other digoxin which is rather loosely

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1
2 "bound and, presumably, the loosely
3 bound digoxin gradually comes out and
4 appears in the urine. At some point,
5 probably the tightly bound digoxin
6 comes out too, but that might take
7 weeks. Again, this is not something
8 that has been studied, although this
9 paper gives some hint of what is
going on."

10 Now, that was Dr. MacLeod's evidence and I want
11 to ask if he has advanced a perfectly respectable
12 hypothesis in this *terra incognita* in which we are
concerned?

13 A. I must say I have the greatest
14 respect for Dr. MacLeod but there are a number of
15 things about what we just read that are confusing to
16 me and I can't agree with.

17 I have problems drawing or extra-
18 polating a great deal from the Ochs paper. It is
19 a classical computer pharmacokinetic analysis of
20 serum digoxin levels and urine digoxin excretions
21 in normal adults, at least, that is my first problem,
22 I don't know how safe it is to extrapolate to sick
23 infants because the literature is replete with
24 differences between infants and adults even when
25



1
2 they are well, much less when they are sick.

3 Q. And if I might stop you there.
4 I accept what you say and if you have a problem
5 about extrapolating, it might be that the process
6 is longer in infants who are sick than in healthy
7 adults, or it might be that it is shorter.

8 A. I just don't know, I can't
9 extrapolate very easily.

10 Q. No, exactly, exactly.

11 A. Now, my next problem is that
12 the Ochs paper has nothing to do with tissue half
13 lives or tissue levels. I can't draw any conclusions
14 about tissue excretion from that paper. The
15 third problem I have with it is Dr. MacLeod's
16 interpretation that the fact that they only accounted
17 for 60 to 70 per cent of the dose, depending on the
18 dose that was given says that that much is remaining
19 in the body. I don't think that that paper
20 demonstrates that because they haven't accounted for
21 any metabolites or any biliary excretion and we
22 know that a certain amount of digoxin comes out in
23 those forms.

24 So, the paper does not substantiate
25 there was still 40 per cent of digoxin remaining in
the body at the end of six days. So, that is another



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point where I disagree with Dr. MacLeod.

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Q. I want to ask you about one of them, and he is engaged as you are, and I take it we are agreed, you are both engaged in a speculative exercise to a large extent at the fringes of scientific knowledge, wouldn't that be fair?

A. I think that is fair to say and I think it wouldn't be surprising if we disagreed. We also disagree on religion and politics and we are still friends.

Q. The point I want to make is that this analysis that doctors have been engaged in as a result of what happened at The Sick Children's Hospital, and where you are giving us inestimable assistance, is an analysis that to a very large extent must be hypothetical because of our knowledge, and is at the fringes of scientific information?

A. Well, that's a part of the problem, and the larger part of the problem is we just don't have enough data on most of these kids.

Q. And two years from now the situation may be all turned around, based on the kind of research work that has now been taken up and the alacrity with which your profession is beginning to learn things as a result of this focus of attention, isn't that so?



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A. It may be.

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Q. Yes.

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A. I don't know whether things will turn around or not, I don't know what things we will have two years from now.

6

Q. Exactly.

7

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A. I am trying to deal with what information we have now.

9

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Q. And you couldn't have predicted two years ago what information you have now?

11

A. That I think is fair to say, yes.

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Q. Now, the only question about Dr. MacLeod, because Dr. MacLeod would not assert that he was advancing a categorical truth, I mean I know him and I can assert that; but he was saying was that at the fringes of this knowledge it is possible, on page 4275 that at some point probably the tightly bound digoxin comes out too but that might take weeks.

18

19

A. That is exactly what I was showing you this morning.

20

21

Q. So that you would accept his hypothesis that the tightly bound digoxin will come out too, but that might take weeks?

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A. We don't know that it would take weeks. The best data we have is that it would



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take five half lives, or somewhere around four days.

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I don't know if it is going to take weeks, I just

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can't respond better than that.

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THE COMMISSIONER: I am sorry, I find
some area of agreement; five times four days.

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THE WITNESS: That is two to three
weeks, yes.

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THE COMMISSIONER: If that is any
comfort to you, Mr. Scott.

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THE WITNESS: We have to be careful
we don't, that we define what we are saying here, that
is not that it will start coming out. If you assume
a half life of 4 days in 20 days you would have
lost virtually 100 per cent of what was in the body
when you started.

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MR. SCOTT: Q But I take it that only
a modest margin of error would be required on that
hypothesis to lead you to conclude that at the end of
20 days there might still be measurable quantities?
Now I know you are going to tell me it is based on
how much went in, and I understand that.

21

A. And how well you can measure it.

22

Q. Yes.

23

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A. And which tissue you have. It
is a long shot, it may be so, I can't say 100 per cent



BB.4

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that it isn't, no, it may be.

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Q And I take it again your observation must be like Dr. MacLeod's a function of hypothesis from limited studies and data?

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A I think that is largely what we are dealing with here.

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Q Yes. Just let me unveil for a moment a personal problem. Lawyers are used to dealing with building blocks they can measure ; doctors I take it are engaged in a scientific inquiry, which is a different exercise.

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Having said that let's go to Belanger and Lombardo. You spent a good deal of time, I think I understand what you said at the beginning, saying that because of the problem with exhumed tissue you could really not draw much more in the way of a conclusion but that digoxin had been administered to these two babies at some time?

18

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A I think that is true based on the tissue digoxin levels, yes.

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Q Now, with these babies, and with the other babies, you then as I understood it, and the hypothesis, you attempted to give us some kind of time frame after which, or at which the digoxin may have been administered. Now I call that,



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just because I am used to the grocery store, the "not before date." You understand what I mean and I think you will recall the formula that you explained to us?

A. I am not sure I understand what you are referring to.

MS. CRONK: Mr. Commissioner, I don't like to interrupt my friend and this may be confusion on my part. I had not thought that the doctor was able to estimate time or route or dose with respect to these two children.

MR. SCOTT: No, he wasn't, and I don't say he did.

MS. CRONK: I thought that is exactly what you did say with respect to them.

MR. SCOTT: Q No, I said with respect to all the babies he attended, and indeed I will come to where Miss Cronk asked you to give an estimate with respect to Belanger and Lombardo on the assumption that the readings were in the ball park, but we will come to that in a minute.

A. You mean the tissue concentrations?

Q Yes. She asked you to do that and I just wanted to get clear that you had some reservations about that exercise in the case of



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Belanger and Lombardo, and I am right about that, am I?

A. I think so.

Q. But if you are going to get into that exercise with Belanger or Lombardo, trying to find the "not before date", I take it what you really do is you take the level that you get, that is one of the items with which you begin?

A. Whatever concentration data I am provided with, yes.

Q. Exactly. You then make an assumption about the dosage and apply what I may call, I hope I am not wrong, the half life principle.

A. I am not sure I did that with these two babies.

Q. No, I am talking about generally, not these two babies.

A. You are talking generally?

Q. Yes.

A. Okay.

Q. Isn't that what you do, and I know I have highly simplified it.

A. Well, if you are talking about tissue concentrations alone, and we believe the concentration in the tissue really reflects - if we assume for the moment that that concentration reflects



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what the actual concentration was in the tissue at the time of death, or during life, then I at least could assume that the patient was either chronically given digoxin, or that they received a dose long enough before death that there was some distribution into the tissues.

Q Perhaps I can go at my problem a little more abstractly without any reference to any of these cases just to see if I understand it. If you got at the end the data which is the serum levels, or the tissue levels.

A. Now which?

Q Either one or the other, you have got a baby who died and you have got let us say one or both of serum or tissue level, that is the data. The first assumption you make is that that data is reasonably accurate, or is accurate?

A. Right.

Q Then having got that someone comes along and says to you, when was that baby given digoxin and in what quantities? Those are the two questions that essentially the Crown Attorney, Mr. Wiley, asked you to attempt to answer?

A. Right.

Q And I take it the way you do



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that is essentially taking other data such as the weight of the baby and so on that you described, and taking the half life principle with respect either to tissues or serum and applying it on the basis of an assumed dosage. Then if the assumed dosage doesn't work out you have to posit a higher dosage or a lower dosage, isn't that the process that we are --

A. Yes. I didn't do it in these particular cases, but I did it obviously in other cases where I had a little more data.

Q. Yes.

A. I did what I think you are outlining, I looked at the size of the baby and took an arbitrary mid range estimate for the volume of distribution, and a possible elimination rate constant and said what dose could have produced the level in this range.

Q. Well then, I think I understand the process. Then what I want to suggest to you is that with that process by its very nature requires some very fundamental assumptions which you have outlined?

A. Absolutely.

Q. And that if any of those assumptions are shown to be wrong, either now or at



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some later stage, it upsets the predictability of the
accuracy of the result?

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A. That is right, and you can take
one extreme or the other and calculate it and see
what your possible extremes could have been.

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Q. And the assumption that you
plug in can eschew the answer one way or the other?

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A. That is right.

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Q. For example, if you plug in
half lives of 35 hours, or 45 hours, or half lives
of 4-1/2 days or 6-1/2 days, you can alter the results?

12

A. Correct.

13

Q. Isn't that so?

14

A. Yes, that's right.

15

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Q. And therefore I suggest to
you, and this is not to demean the exercise at all,
because it is very useful; but I suggest to you that
it is in its nature the best we can do perhaps,
but it is fraught with risk, wouldn't that be fair?

17

18

A. I think so.

19

20

Q. Of mistake?

21

A. It's not an exercise which will
give you an exact estimate.

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Q. And not only that, but having
conceded that, it is very difficult to say what the



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margin of error may be, because you don't know which assumptions may be wrong and the extent to which they may be wrong?

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A. Only to the extent that you may know what the extremes of reported estimates for those assumptions are.

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Q And therefore I take it that you would want the answers you gave to be read subject to the exchange we have now had?

9

10

A. I made those kind of caveats very clear in my original report.

11

12

Q Well I think you did, and I think you made them clear here. The sense I got from listening to my colleagues was that you were some kind of magic man who could predict how much digoxin was given and when. I take it that when your process is understood it has to be read, to be fair to you, with regard to the very substantial assumptions you are obliged to make, and with regard to the prospect of error of which you may quite properly know nothing, isn't that fair?

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A. I think that is fair, and the best you can do under those circumstances is say that this is my best estimate of what the most likely possibilities may have been, that's all we can do.

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BB.11

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Q. Exactly.

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A. And it leaves us all in the
same place.

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Q. Exactly, it is an estimate
about a possibility.

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A. I think so.

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Q. Yes. Well now, on Belanger --

9

A. Some possibilities are more
probable than others.

10

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Q. Now that is a theological
question and we will leave that for some other day.

12

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You see the trouble I get into is that Miss Cronk
examined you for Mr. Hunt at page 5760, Volume 72,
about Belanger. Well, let's deal with Belanger at
5760.

14

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A. May I see a copy of that, please?

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MR. SCOTT: Yes.

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18

MR. TOBIAS: May we have the volume
number, please?

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MR. SCOTT: Volume 72.

20

MR. TOBIAS: Thank you.

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MR. SCOTT: Q. Well, maybe it isn't necessary to read it out loud, doctor. If you would like to read from line 20 on page 5760 over to line 17 on 5762, I don't think you need to hear my voice to do that.

Have you had an opportunity to read that now, doctor?

A. Yes, I have read from line 17 on 5760 to line 17 on 5762.

Q. Yes. My worry about that exchange between you and Miss Cronk is that that will be used at some stage - I'm sure not by Miss Cronk but by somebody else perhaps to assert that your evidence was that the digoxin in the Belanger baby could not have been administered except within 20 days of his death, and I don't have a note of it now but you gave the same kind of answer with respect - a different time frame I think - but the same kind of answer when she asked you that question about Lombardo as well.

I just want to be sure I understand. I take it that that answer must be read subject to your overriding observation that because of the problem with exhumed tissues you can't really draw, nor I believe can anybody else, draw any significant



1
CC2 2 conclusions to a level of significant probability?

3 A. I didn't expand on this because
4 I wasn't asked several days ago, but I could explain
5 to you a little more why I said what I did and what I
6 meant. If you want me to I can answer you with a
7 yes or no.

8 Q. Well, I would like you to
9 first of all answer with a yes or no.

10 A. And what is the question again?

11 Q. The question is --

12 THE COMMISSIONER: And after you
13 have answered it yes or no then you are entitled to
14 add --

15 THE WITNESS: Okay.

16 THE COMMISSIONER: We always say that
17 to witnesses and sometimes they give us their
18 explanation and forget to tell us yes or no.

19 THE WITNESS: Okay.

20 MR. SCOTT: Let me present the
21 problem. We are trying to find out if we can what we
22 can now as a matter of probability.

23 A. Yes.

24 Q. There are all kinds of possi-
25 bilities. We are trying to find out something to that
fairly sophisticated level of probability, and I have



1
CC3 2 heard your evidence about Belanger and Lombardo that
3 because of the exhumed tissue, the qualifications you
4 impose - what I am really asking: You are not assert-
5 ing in that answer anything on the balance of
6 probabilities, are you? You are simply saying this is
7 a good guess on my part but nothing more?

8 A. No. What I said, and I will
9 read it to you, is - the question was:

10 "...You will recall that this child
11 from the time of his admission to
12 the Hospital to the time of his
13 death was hospitalized for approxi-
14 mately 35 days. Again given the
15 information that is available to you
16 from the abstract, and having regard
17 to the concentrations that were found
18 in this child, is it possible in your
19 view that traces of digoxin could be
20 found in tissues, and remember again
21 that they are exhumed tissues, from
22 his body if a therapeutic or loading
23 dose of digoxin had been administered
24 to him in error at any time during
25 that 25-day period?"

And I said:

"I suppose it is possible, but



1
CC4 2 considering the dose that he would
3 have received under those conditions
4 I think it is highly unlikely that it
5 would be detected as long as 35 days."

6 Q. Now, what I am suggesting to
7 you is that you are not asserting that it might --
8 let me put it this way: Do you agree that it might
9 well be detected for 25 days? Detected?

10 A. I think it is highly unlikely
11 that it would be detected with the kind of dose we
12 are postulating here at 25 days, and I will illustrate
13 to you why my reservations in a moment when I am
14 finished.

15 Q. All right. Illustrate your
16 reservations, please.

17 A. Now as you pointed out the
18 major handicap here is having exhumed tissues, so we
19 have numbers that we have to use which we don't have
20 nearly the confidence in as if they were fresh
21 tissues. They are the only numbers we have and they
22 could be somewhat larger or smaller.

23 Q. Could I just interrupt you,
24 doctor? Is this your assertion based on the proposi-
25 tion that the numbers in Belanger were in the ball
park?



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A. The ball park of fresh tissue?

Q. Yes.

A. I can't assume that necessarily, but let me show you what happens to the numbers if we use what numbers we have.

Q. No, but I am saying to you you have already told us that you can't use with any assurance the numbers you have.

A. But I am doing a lot of things through these exercises without a lot of assurance.

Q. All right. I am not going to interrupt you because you are certainly entitled to tell us whatever you want, but what I am going to ask you to do is I am going to ask you eventually, if you want to get into this exercise, to take the lowest measurable quantity of digoxin, .5, and assume that that is what the reading of exhumed tissue in Belanger represents.

Do you follow me?

A. No, I don't.

THE COMMISSIONER: The dose that --
no.

MR. SCOTT: Q. No. If we have an exhumed reading of a level in Belanger.

A. Yes.



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Q. All right. You have told us that you have not great confidence that that level represents anything actual.

THE COMMISSIONER: Other than the fact that there was digoxin at one time in the child.

THE WITNESS: That it is there.

MR. SCOTT: Q. All right. I am going to ask you, I don't want to inhibit your explanation, but I am going to ask you to assume if you want the best case from the accident point of view, that is assume the lowest measurable level, .5.

A. That is in serum.

Q. All right. What is the lowest measurable level in tissue?

A. I am not sure, but my impression from the paper that was provided to me was that it was not quite that low. It depends to some degree on the quantity of tissue that is available to extract.

Q. Let's take .5 then.

A. Let's take .5 as an illustration.

Q. Okay.

A. And let's say that this 43 in skeletal muscle was really .5 and some change took



CC7

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place after burial that the apparent level was
elevated from .5 to 43.

3

4

Q. Yes.

5

A. So let us use .5.

6

Q. Yes.

7

A. But we don't --

8

Q. We don't know. That is it.

9

A. Let's leave it at that. Let's

10

say at 35 days he got a dose somehow, a maintenance
dose that he shouldn't have received, somehow he got
that 35 days before he died.

11

12

Q. All right.

13

A. That is our assumption.

14

Q. Yes. That is the first
assumption we are making.

15

16

A. Okay. No, that's the second
one. We are assuming a digoxin concentration and
now we are assuming when he got the dose.

17

18

Q. Yes, all right.

19

A. So we have got two assumptions.
And the maintenance dose, we don't know what size --
we don't know whose maintenance dose it was.

20

21

Q. Right.

22

23

A. It may have been for a kid who
was three times his size or his size.

24

25



CC8

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Q. Yes.

3

A. And that we really don't know
for sure.

4

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Q. That is really your third
assumption because you have to pick some figure.

6

7

A. Well, a maintenance dose for
this kid would have been 10 micrograms per kilogram.

8

9

Q. No, but this kid wasn't on
digoxin.

10

11

A. I know, but you have to make an
assumption.

12

13

Q. Exactly, so you have to make
another assumption.

14

A. Absolutely.

15

Q. All right, that is our third
assumption.

16

17

A. What do you want to assume in
terms of a maintenance dose? A kid his size or
bigger or...? It is your choice.

18

19

Q. Let's take a child his size.

20

A. Okay.

21

Q. And I take it there that that
is the third assumption in which variables plugged
in can alter the formula?

22

23

A. That is right.

24

25



CC9

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2

Q. Okay.

3

4

A. So let's weight it so we have
the best chance of detecting at the --

5

6

Q. Sure, I have a feeling you are
going to show me up so you tell me the assumptions
to make that help me the most.

7

8

A. I am not going to bait any
traps.

9

10

Q. Well you can see I am not, so
you just go right ahead.

11

12

13

A. Okay. So we have a dose, a
maintenance dose that, well, we don't really need to
worry about that. We will look at the dose a little
bit later.

14

15

Q. All right.

16

A. Because we are going to work
backwards.

17

18

Q. Yes.

19

20

A. So at 35 days, and can we have
a fourth assumption that the tissue half life is
four days?

21

Q. We have to have a fourth
assumption, don't we?

22

23

A. Yes.

24

25

Q. All right now, why four days?



CC10

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A. We don't -- I don't know, we can use one and a half days.

Q. If we pick three days we are going to get a different result? If we pick five days we are going to get a different result?

A. Yes; we will.

Q. If you think there is something magic about 4, I will go with 4.

A. It is the only number that we have from tissue, and not even tissues we have here.

Q. Well, if you accept Ochs, of course, you might pick a much larger figure, mightn't you?

A. If I accept what?

Q. If you accept Professor Ochs, you might pick a much larger figure than 4?

A. Professor Ochs didn't --

Q. But you didn't, so --

A. Professor didn't say a thing about tissue half life. He didn't even allude to tissue half life.

Q. No, but he implied that 40% of digoxin might be found in the body after six days. Now you have explained what you think of that.

A. Professor Ochs did not say that.



CC11

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Q. I don't --

A. Professor MacLeod said that
based on Professor Ochs' paper.

Q. Well, therefore there is this
chance that if Professor MacLeod is right and you are
wrong we have again made an assumption that is going
to produce a fundamental variance.

A. Professor MacLeod knows better.
He forgot that digoxin was metabolized.

Q. Okay. All right, we will pick
up the figure 4. That is the figure you came up with
first. I just want to get the variables in this
exercise.

A. Okay. 4 into 35 is 9.

Q. Don't look at me. 8.

A. 8?

Q. No, you want me to say 9
because it is easy. You don't want fractions.

A. 8 is fine. 8 half lives.

Q. I haven't done this kind of
long division since I was in Grade 5, usually standing
at the blackboard.

A. 8 half lives.

Q. All right.

A. You take 2 to the 8th power.



CC12

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Q. Yes.

3

A. I don't have a scientific

4

calculator with me, but it is going to be an enormous
number and if we multiply that times .5 you are
going to get a concentration that is inconceivable at
the beginning of that process.

7

Q. Yes. All right. So what do

8

you conclude from that?

9

A. I conclude that I think it is

10

highly improbable that this infant could have re-

11

ceived a maintenance dose 35 days prior to his death

12

and have a tissue concentration of 48 micrograms per
gram.

13

Q. And in the course of that you

14

have made four assumptions at least.

15

A. That is right.

16

Q. And I take it that a variable

17

in any of those assumptions can significantly alter

18

your figure?

19

A. Well, let's do it.

20

Q. All right.

21

A. Let's say that the tissue

half life is really --

22

Q. 10.

23

A. 6 -- 10 days?

24

A. Well, okay.

25

A. 10 days, that would be 3½

half lives.



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So, we are going to take .5 and one half life prior to that it was 1 and another half life, that was 2 and another half life it was 4 and a half of a half life before that is something greater than 4.

Q. Well, add it up, I can't add it up?

A. Well, no, this is the final number.

Q. I see, right.

A. If you pick a half life of 10, that's one extreme; if you pick a half life of a day and a half on another extreme well then, you end up with, again, a tremendous number.

Q. So, what is the range?

A. I don't know because I don't know what the range of half lives in tissue are.

Q. Exactly, okay. And that is an imponderable?

A. But I think it is unlikely, and also I think you have to say, at least I have to say that I think it is unlikely that there would be a tenfold change in tissue concentration, increase in tissue concentration due to changes following



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2

burial, but again, we don't have solid information
that I could point to to substantiate that, all I
can say is I think that is an enormous change.

4

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Q. But isn't that in the end
why in the case of Belanger and Lombardo you say,
these figures can't tell me anything really except
that there was digoxin present?

8

9

A. That is I think essentially
true, yes.

10

11

Q. Because you have so many
variables.

12

13

14

A. The digoxin levels in and of
themselves, really, you can't be certain of anything
else other than whether it is true, that it was there
and it should not have been.

15

16

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18

Q. Yes. Now, therefore, for
Belanger and Lombardo, the whole story depends on
the existence of digoxin in two babies who were as
far as we know not supposed to have any, right?

19

20

A. Well, it's not the whole story
but it is a big part of the story.

21

22

Q. Well, it is the story that
we are talking about.

23

24

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A. It is a very important part
of the story.



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Q. Right. I take it that the assumption, which is at the foundation of that fact, is that mass spec. has accurately determined the existence of digoxin in those two babies.

A. I can't comment on the mass spec.

Q. No.

A. But I assume that what is reported as dig. is in fact digoxin.

Q. Yes. But in those two cases if it were demonstrated that the mass spec. results were not reliable as pointing to digoxin, then you would say, look, I can't draw any conclusions about Belanger and Lombardo?

A. I think that would markedly reduce my confidence in any conclusions that I would draw.

Q. It would move them quickly from 4 and 3 on your Attorney General's list down to 1, wouldn't it?

A. Well, I don't know, I can't comment on what I would do. That wasn't the Attorney General's list, that was the CDC list.

Q. I am sorry.

A. I am not sure what effect it



1
2 would have but I would agree with you that it would
3 lower them to some lower rating I anticipate and I
4 would have less confidence in my original conclusions
5 yes.

6 Q. Yes. Well, Mr. Cimbura has
7 indicated that he has less than perfect confidence
8 in the mass spec. with respect to Belanger; you were
9 aware of that?

10 A. No, I wasn't. I haven't seen
11 his testimony.

12 Q. You would take account of that
13 I take it in rating Belanger?

14 A. If I knew what was said and
15 had some confidence in that information, I certainly
16 would take it into consideration, yes.

17 Q. Well, let's see if I can find
18 it. 1715 in Volume 52 but we can't find Volume 52.

19 THE COMMISSIONER: We could of course
20 take our break now if you want to?

21 MR. SCOTT: No. If you would like
22 to.

23 THE COMMISSIONER: No, I don't
24 particularly want to.

25 MR. SCOTT: Well, I can't find it and
that's my fault. But I take it if Mr. Cimbura had



1
2 less than 100 per cent -- at page 1713 with respect
3 to the Belanger mass spec. Mr. Cimbura says this:

4 "That's right, there were again two
5 different tests, two separate tests
6 done. The result of the first test
7 was negative with a notation by the
8 mass spectrometrists that the extract
9 was very impure. Following that we
10 have attempted to purify more of the
11 extract by subjecting it to successive
12 HPLC purification and another test was
13 conducted by GC mass spec. The result
14 worded by the mass spectrometrists
15 were..."

16 And he is reading obviously from a form.

17 "...may be present', and even after
18 this extensive purification the extract
19 was still not an ideal extract for
20 mass spectrometry and after discussion
21 with the mass spectrometrists and my
22 review of all of the results I have
23 reached a conclusion that both results
24 were inconclusive."

25 Now, I take it that if his view is that
the results in Belanger were inconclusive for



1
2 digoxin ---

3 MR. HUNT: I am sorry, it was only
4 the mass spec. results?

5 MR. SCOTT: Yes, that's right, that
6 they were inconclusive for digoxin, would that have
7 any impact on your views?

8 A. Not just the information you
9 have given me. You know, mass spectrometry, as
10 wonderful as it is, isn't perfect either. With a
11 very complex matrix like tissue it isn't terribly
12 surprising that they might have difficulty getting
13 enough material out and isolate it enough that they
14 could produce a good mass spectrum to get a
15 definitive mass spectrum. It isn't uncommon in a
16 situation like that for the mass spectrometry not
17 to be terribly sensitive when they are trying to
18 document the presence of the substance.

19 So, based on that information alone
20 that you just gave me, I'm not sure that I would
21 change anything one way or the other at that point.

22 Q. Well, you begin with the
23 proposition that there is digoxin present and that
24 is because what you have been told by Mr. Cimbura
25 and others?

A. No. If the only thing that I



1
2 was told was that they took some tissue and they
3 did an extraction and they injected it on the GC
4 mass spec. and one time they saw a bunch of garbage
5 and the second time they saw a mass spectrum that
6 was compatible but the quality wasn't good enough
7 to be sure of digoxin, I would suspect that there
8 was digoxin there and then if it was important to
9 know, try to do some additional things to try to
confirm it one way or the other.

10 Q. Well, it is important to know
11 here.

12 A. Yes, in this case it is very
important.

13 Q. And if the mass spectrometry
14 tests are conclusive, what else do you want to know
15 before you make your assumption that there was
16 digoxin in the case of the Belanger baby?

17 A. If the mass spec. was definitive
18 in demonstrating the presence of mass spectrum that
19 was digoxin, then that would give me additional
20 confidence along with the immunoassay and the HPLC
21 radioimmunoassay that was there. If the mass spec.
22 was negative, and I'm not a mass spectrometrists,
23 but if the mass spec. was negative then I would
have to be assured that there was a reasonable



1
2 chance that if it was there they would have been
3 able to produce a spectrum on it.

4 Q. In other words, you would
5 have to be satisfied that for some reason the mass
6 spectrometry failed to produce it for some reason
7 that is legitimate and understandable and consistent
8 with the presence of digoxin?

9 A. I think if I understand what
10 you are saying I agree with you.

11 Q. Yes.

12 A. You see, in a very complex
13 dirty matrix like tissue a substance could be there
14 and you wouldn't be able to produce a clean enough
15 spectrum to be sure you saw it. If you put the
16 same amount of digoxin in a pure solution and ran
17 the mass spectrum you could produce a nice clean
18 spectrum. That's just a technical problem that
19 tissue presents.

20 Q. Well, if you were told that
21 in the cases of Belanger and Lombardo the mass
22 spectrometry that was done did not, to a significant
23 degree, illustrate the presence of digoxin in the
24 body, in the exhumed tissues of those two babies,
25 would that lead you to qualify your assumption in
this case?



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A. Yes, I think you have given me a hypothetical question and I will give you a hypothetical answer.

Q. Yes.

A. If I was assured that mass spectrometry had failed to demonstrate the presence of digoxin in the tissues I would have a greatly decreased confidence that it was there.

Q. Yes. Can you tell me, maybe it is just an unfair question, what would that do to your CDC list where you got them at 4 and 3 respectively?

A. I would have to look at it but I suspect, answering you without a great deal of forethought, that if my assessment of the highest probability was that there was no digoxin in their tissues, they would probably be reduced from to a 2 or a 1.

Q. Thank you.

A. Depending on their clinical status. You see, I was asked to look at the paper from a pharmacological point of view.

Q. Yes, I understand.

A. And when digoxin was not documented to be present, I did not go on to



1
2 secondary considerations to a great extent in looking
3 at clinical course and so forth because the
4 cardiologists were doing that.

5 Q. Yes. Well now, let me just
6 go to one or two other areas where my understanding is
7 feeble.

8 The first one I want to deal with is
9 Baby Pacsai. I just have one sort of layman's problem
10 about this baby. We know that this child was very
11 ill at both St. Joseph's Hospital and the McMaster
12 Medical Centre before the baby even came to Toronto,
13 I mean, that is apparent, isn't it. And we know for
14 example that at McMaster, if not at St. Joseph's
15 the serum potassium was over 7 and there was profound
16 acidosis.

17 A. That's correct.

18 Q. Can I conclude therefore that
19 at McMaster the baby was seriously sick?

20 A. That was my impression, yes.

21 Q. Yes. Indeed, I think if you
22 look at the chart the baby perhaps almost died at
23 McMaster?

24 A. I think that is apparent, yes.

25 Q. And then the baby was transferred
to the Hospital for Sick Children and the chart says,



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I don't know the page number but I think it is generally - you might not disagree with this - the baby became progressively lethargic, bradycardic and limp and shortly before death had a potassium level again of over 7, 7.7. Is that the way you have read the chart?

A. No, I don't think that is all the information that is in the chart. I should be looking at the chart while you are going over it so I refresh my memory.

MR. HUNT: Exhibit 106.

MR. SCOTT: I think if you look at page 63 of the chart.

A. 63?

Q. Yes. Someone has suggested page 65.

Have I summarized the case reasonably accurately?

A. You are looking at page 63.

Q. Through 65.

A. Oh, through, okay, I am sorry, I didn't go on.

- - - -



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Q. "After the child was admitted to The Hospital for Sick Children he became progressively lethargic, bradycardic and limp and shortly before death had a potassium serum level of 7.7."

A. That wasn't exactly my understanding of the Hospital course, no.

Q. Well, if you look at page 65 for example, half way down the page:

"He was lethargic and limp ... ", this is the nurse's note.

A. That was at the point that he suddenly changed?

Q. Yes.

A. The second day, is it the second day of his hospitalization?

Q. Yes.

A. And remember he was admitted on the 10th or 11th.

MR. OLAH: He was admitted on the 11th at about 3:57, Doctor.

THE WITNESS: In the morning?

MR. OLAH: 3:57 in the afternoon.

THE WITNESS: In the afternoon. Okay,



EE.2

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so this is about 12 - if I am looking at the right
note it is 3:45 to 6 o'clock, note on March 12th?

MR. SCOTT: Q Yes. Can you find his
potassium level just before death?

A. So that was about --

THE COMMISSIONER: Hold on, Mr.
Shinehoft has something to say. Yes, Mr. Shinehoft?

MR. SHINEHOFT: I believe Mr. Scott
indicated that this baby's potassium level at McMaster
University was in the 7 range. I was wondering if
Mr. Scott might point out to me where in the chart
it indicates that?

MR. SCOTT: Well, the chart doesn't
indicate it, but Dr. Bain's report; the chart is
The Hospital for Sick Children chart, but Dr. Bain's
report at page No. 27 - I'm sorry, it is at page 33 of
the chart if you want it, the bottom of the page.

MR. SHINEHOFT: I have the records
from McMaster University and I would be happy to show
my friend.

MR. SCOTT: It is at page 33 of
The Hospital for Sick Children chart, two-thirds of
the way down the page.

THE COMMISSIONER: Page 33, mine is



EE.3

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St. Joseph's Hospital.

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MR. SHINEHOFT: Yes, that is correct, Mr. Commissioner. I have the potassium levels from Chedoke-McMaster and I would be happy to show Mr. Scott as well as the doctor.

MR. SCOTT: The point, the only point I need for this series of questions is that I take it before the child came to Sick Kids he had had a potassium serum level of 7.4, I can demonstrate that by looking at page 33.

MR. SHINEHOFT: But you know, that is not the entire picture, Mr. Commissioner, with all due respect.

MR. SCOTT: Well, my friend can examine further, I mean, his time will come.

MR. SHINEHOFT: If he is going to put the proposition to him I think he should put the proposition to him fairly. I think he should review first of all potassium levels at St. Joseph's Hospital, and his potassium level at the Chedoke-McMaster Hospital, so that the doctor has a true picture of what exactly those levels were before his admission to The Hospital for Sick Children. I think that is only fair, and I happen to have this.

MR. SCOTT: My friend can ask questions,



EE.4

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2 I don't have that information.

3 MR. SHINEHOFT: If you would sit down
4 until I am finished perhaps the Commissioner can
5 perhaps make a ruling. I have these papers here, I
6 have the chart, and I am prepared to show my friend
7 Mr. Scott, and yourself, Mr. Commissioner, and the
8 doctor, so that we have an accurate picture of
9 exactly what happened before this --

10 THE COMMISSIONER: That is true, Mr.
11 Shinehoft, and we don't pay too much attention to the
12 rules of the game. The rules are these, that
13 ordinarily if this were a court of some kind of
14 justice, if this is in evidence before us and if
15 Mr. Scott is putting a question to the witness and
16 putting it inaccurately, then you would have a perfect
17 right to stand up and say it is not done properly, let
18 us put it properly and let us do it. If you have some
19 additional evidence that we haven't had you can't
20 expect Mr. Scott at this point to be able to rely
21 upon it.

22 MR. SHINEHOFT: With all due respect,
23 Mr. Commissioner, I referred to it when I examined
24 Dr. Bain and I referred specifically to it.

25 THE COMMISSIONER: Has it been put in
in evidence?



EE.5

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MR. SHINEHOFT: No, that was --

THE COMMISSIONER: Then you will have to do that when it comes your turn to destroy everything that Mr. Scott has established.

MR. SHINEHOFT: I am not trying to destroy Mr. Scott, I am just asking Mr. Scott to present the entire picture.

MR. SCOTT: If this is the way you are helping me I can certainly do with it.

THE COMMISSIONER: Look, you carry on, we don't seem to have had that evidence yet so you don't need to concern yourself with it.

MR. SCOTT: Q If you look at page 33 --

A. I am handicapped because my page 33 is unreadable.

Q Well, mine is pretty unreadable too.

THE COMMISSIONER: Mine is a little better if you want to have it.

MR. SCOTT: Q This is for St. Joseph's Hospital, and the solicitor for the McMaster Hospital is a little upset that I haven't referred to it. Does that not show a potassium level on that page of 7.4?

A. I see K 7.4 and I can't read anything else around it.



EE.6

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THE COMMISSIONER: Up above seems to
be NA131.

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THE WITNESS: Was this at --

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MR. SCOTT: Q Well, what I am trying
to establish and maybe Miss Cronk can help us, is
whether there was, before the baby came to Sick
Children's a potassium reading of 7.4, I thought that
was what page 33 said. Now your chance has come.

9

THE COMMISSIONER: Yes.

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MR. SHINEHOFT: I may be able to help
you, Mr. Commissioner, I happen to have a legible
copy of --

13

THE COMMISSIONER: Page 33?

14

MR. SHINEHOFT: Yes, I do.

15

THE COMMISSIONER: Mine is legible too,
I see NA131, K7.4 and underneath that 96.

16

MR. SHINEHOFT: That is correct.

17

18

THE COMMISSIONER: I don't know what
96 stands for.

19

20

THE WITNESS: I think that is the
chloride concentration.

21

THE COMMISSIONER: All right, chloride,
oh yes.

22

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MR. SCOTT: Counsel for the parents
has agreed that as at that date the baby had, I gather



EE.7

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at St. Joseph's Hospital, a potassium level of 7.4.

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MR. SHINEHOFT: Let me show the doctor,

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there is a K --

5

MR. SCOTT: I am ahead of even you,

6

I know what the "K" means.

7

MR. SHINEHOFT: Doctor, I think this

8

is what my friend is referring to.

9

THE WITNESS: Yes, this is a readable

10

copy.

MR. SHINEHOFT: You can perhaps use it.

11

THE WITNESS: Thank you.

12

THE COMMISSIONER: Now, Mr. Scott, do

13

you want to get on with whatever that question was?

14

MR. SCOTT: Q. The point very simply,

15

Doctor, is this; that before the baby came to Sick Kids

16

it is apparent that it had a potassium level elevated

17

at 7.4; before death it had a potassium level of 7.7.

18

The baby was very sick. Those three facts we seem

to know. Are you with me so far?

19

A. Those facts are very incomplete

20

but technically they are correct.

21

Q. Yes, all right. And your

22

testimony, and I don't have the page for Mr. Hunt but

(2)

23

I will try to get it later on, suggested to me at

24

least that the high potassium was indicative of toxicity?

25



EE.8

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A. Which one?

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Q. The 7.7.

4

A. The latter one?

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Q. Yes.

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A. I think that is a likely possibility.

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Q. All right. Now, how do you explain - let me ask you this, why is the 7.4 at St. Joseph's not indicative of digoxin toxicity?

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MS. CRONK: Well, now, sir, I am going to be on my feet. The point has been twice made that the witness has not had a chance to review those documents from St. Joseph's. My friend Mr. Shinehoft tried to put the ones from McMaster to him. Surely he is not asked to answer that question, and in all fairness to him he should be given an opportunity to read the entire piece of paper.

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MR. SCOTT: Sure, he can take all his time.

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Q. Do you understand the problem I have?

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A. I am not sure what your problem is. My problem is I can't interpret potassium readings in isolation without any other information.

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Q. My problem is that one of the

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things you said was that the potassium level of 7.7 was indicative in this baby of digoxin toxicity. I accept that. What I want to ask you is, is the 7.4 indicative of digoxin toxicity, and if not, is it possible that there is something going on here that is not connected with digoxin that produces an elevated potassium level?

A. I can't comment on the first elevated potassium until I look and see what the surrounding circumstances were. Because as I pointed out the other day a number of things can cause an elevated serum potassium concentration. I really can't respond to your question until I look and see what was going on when the first potassium was drawn.

Q. And I take it we haven't got enough material to enable you to do that?

A. We may if I have a look at this, I don't know.

THE COMMISSIONER: I think Mr. Shinehoft was up first.

MR. SHINEHOFT: With the greatest of respect, Mr. Commissioner, I don't think that is the evidence that the doctor gave.

THE COMMISSIONER: What evidence that he gave?



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MR. SHINEHOFT: The fact that the elevated potassium was necessarily indicative of digoxin toxicity.

THE COMMISSIONER: That is what he said, he said it might be indicative.

MR. SHINEHOFT: I would refer Mr. Commissioner to page 5796 at line 7, I believe it is yesterday's evidence where the doctor says:

"I think we have to remember that hypokalemia is not a consistent finding in digoxin intoxication, it may or may not occur."

THE COMMISSIONER: I don't see that at all.

MR. SCOTT: Mr. Commissioner, it is almost time for the break, and before I get any more help from my colleagues at the bar perhaps I can just outline what the problem is.

THE COMMISSIONER: Yes.

MR. SCOTT: The problem is that this baby had an elevated potassium level and died.

THE COMMISSIONER: Right.

MR. SCOTT: That was taken to be some evidence of digoxin toxicity. The additional fact is that in an entirely different hospital this baby



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had an elevated potassium level and almost died.

THE COMMISSIONER: Yes.

MR. SCOTT: What is that evidence of?

THE COMMISSIONER: Let us now take the break and I think we will give the witness time to consider all pieces of paper that everybody wants to hand to him in the meantime. I think I mentioned this to you before, we always managed to ruin a witness' break.

THE WITNESS: Yes.

THE COMMISSIONER: But you understand what Mr. Scott's problem is?

THE WITNESS: I think so.

THE COMMISSIONER: Do you want to answer it now or do you want to wait and look at --

MR. SCOTT: Do you want to take the break?

THE WITNESS: I think I could answer it but I need to be sure I am straight on the facts of when the first one was taken, what intervened between and what existed when the second one that you are referring to was taken.

THE COMMISSIONER: Yes. We will take 15 minutes and you can look into that.

THE WITNESS: Okay.

--- Short recess.



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--- on resuming.

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THE WITNESS: The question I am

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responding to is why on the 7th of March 1981 when

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Kevin Pacsai presented to St. Joseph's Hospital at

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Hamilton with a potassium of 7.4 not considered

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digoxin poisoning and why it was consistent with

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digoxin poisoning at a later date at the time of

9

his death.

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Is that a fair statement of the

question?

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THE COMMISSIONER: Yes, that is right,

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as I understand it. Is that not your question? 7.4 --

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THE WITNESS: 7.4 on the 7th.

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THE COMMISSIONER: And 7.7 --

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THE WITNESS: On the 12th when he

died it was 7.7.

16

MR. SCOTT: Q. The question I am

17

asking is really this: The baby in St. Joseph's

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had an elevated potassium level and I think almost

19

died. The baby had an elevated potassium level at

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Sick Kids and did die.

21

Is there something about that baby

or must digoxin be the intervening factor?

22

A. Well --

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Q. I mean if the baby had died at

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St. Joseph's Hospital with a potassium level of 7.4, there perhaps would have been no suggestion of digoxin toxicity. The baby did die at Sick Kids with a potassium level of 7.7 and some people say the baby was poisoned.

Now can you resolve that dilemma for me?

A. I think so.

Q. Thank you.

A. The conditions at the time the potassium was obtained on the two occasions were quite different. And I think this explains -- it affects the interpretation of the potassium concentration in serum.

As I read the chart when the baby arrived at St. Joseph's Hospital he was, as you said, almost dead. He was cyanotic. He had a heart rate in the neighbourhood of 240. He was barely breathing. His temperature was subnormal. His blood sugar was very low and they immediately drew blood gases - his pH was 6.97 and among the other laboratory studies that were obtained he had electrolytes done and potassium was 7.4.

The chart suggests to me that these were all done within a fairly short period of time so



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that probably all that information represents the same condition of the infant at that moment.

So then therapy was started -- well, let me stop there.

So there are at least three very good explanations for the high potassium at that point. One is that he was severely acidotic, and it is well known that severe acidosis increases serum potassium, and I covered that previously.

He was hypoglycemic. That also is consistent with high potassium concentrations. And he was hypoxic. His oxygen saturation was 66%.

So there are very good explanations at that moment in time for his high potassium.

Then over the next few hours he responded to therapy. His pH gradually came up and his blood gases became normal and his potassium returned to normal and he was transferred to I believe McMaster.

At McMaster he had a whole series of normal potassium concentrations determined, as well as blood gases.

He was subsequently transferred to Sick Children's Hospital, and his first potassium - and now I need to turn to the child's chart if you will



FF4

1
2 indulge me for a moment.

3 I don't know how these charts are
4 put together.

5 THE COMMISSIONER: I don't either,
6 and we have never understood that.

7 MR. SCOTT: Commission staff will
8 answer to that.

9 A. Okay. He arrived at six -- he
10 arrived on the afternoon of March 11th. He I think
11 is described as being stable at that time with normal
12 respiration, normal ekg and normal heart rate, normal
13 blood pressure and so forth. His blood gases reported
14 at 1615 on March 11 were a pH of 7.31 which is okay.
15 I don't have a blood sugar I don't believe, but there
16 is no indication from the chart -- yes, I do. Well,
17 not at that time we don't.

18 His potassium was 3.9 at 1745 on
19 March 11, which is normal. And that I believe was
20 12 to 13 hours prior to his death, his arrest.

21 Then right about the time that his
22 condition suddenly changed he had blood gases obtained
23 probably because he had suddenly changed. His pH was
24 7.47. The oxygen was 161.. Those are both normal.
25 The oxygen was a little high but he was receiving
some additional oxygen in the air he was breathing.



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At that time, well, an hour and a half later, the potassium is 9. And we know that that was slightly hemolyzed so it was something less than 9. It was repeated at 7:20 and it was 7.7, so we can know that it was somewhat less than 9 an hour before that, or fifty minutes before that, and 7.7 at that time.

So what I have at St. Joseph's is a baby who had been sick for a week to ten days before that. Had in fact been seen prior to that emergency room visit. Had continued to do poorly. Showed up on death's doorstep severely acidotic, hypoglycemic and hypoxic and it is not surprising his potassium was 7.4 at that point. It was in my mind totally explained.

At the time that his potassium was 7.7 he had been demonstrated to have normal potassiums prior to that with normal renal function and a normal pH and a normal oxygen status and a normal blood sugar of 82.

So I don't have the kind of explanations for the second level that I had for the first level, and that is essentially within the digoxin data that was presented in the description of his terminal event.



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Q. That wouldn't normally drive
us to poisoning, would it, as a cause? Or would it,
in the Hospital?

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A. I think I said it was consistent
with that. It could have been due to other things.

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Q. What I would like to suggest
to you is the history reveals, as a hypothesis - I
don't pretend the possibility of any certainty with
any of these things, but as a hypothesis there is
something about the pathophysiology of this child
that may explain his death.

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A. There is?

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Q. Well, I am asking you, as a
hypothesis.

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A. I am not sure what you are
referring to.

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Q. Well --

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A. I hadn't considered that.

18

Q. You hadn't considered that?

19

A. No.

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Q. Let me deal with one other
possibility.

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Dr. Costigan was treating this child
at Volume 45, page 36 -- through to page 35. I don't
want to read it all -- explains that to reduce the



1
FF7 2 potassium level he took three aggressive courses of
3 action. I don't know if you have read that transcript?

4 A. No, I have not seen this
5 testimony. I would like to see it if you are going
6 to refer to it.

7 Q. I don't want to take the time
8 to read it all, but he administered atropine. He
9 gave an enema of an exchange resin which exchanges
10 sodium for potassium across the bowel wall and it
actually removes potassium from the body.

11 A. That is kaexelate.

12 Q. You are familiar with that?

13 A. Kaexelate, is that what he
14 said?

15 MS. SYMES: Page 66 of the chart.

16 THE WITNESS: I want to see the
17 testimony if we are going to talk about it.

18 MR. SCOTT: Q. He increased the
19 concentration of glucose. It is at page 36, 37, if
you have got that, at the bottom.

20 A. I just received it. Thank you.

21 Q. I think if you begin at line
22 19, doctor. He says:

23 "Q. How do you treat high potassium?"

24 "A. What we did was, we did a few
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little avenues, a few approaches..."
and then read over half-way down page 37.

Have you got that?

A. I am on page 37. I was reading
page 37.

Q. Have you got to the three things
he said he did?

A. He gave the resin.

Q. Yes.

A. He gave the glucose.

Q. And he gave the atropine.

That is actually on page 35.

A. 35?

Q. Yes, at line 15. Do you see
that?

A. I see he gave it but I don't
see any relationship to reducing potassium.

Q. All right. Well, with that
rider can I ask you now to turn to page 45.

A. In fact, I think he gave it
to increase the heart rate.

Q. Pardon?

A. To increase the heart rate.

Q. Can I ask you to turn to page
45 where Mr. Lamek asked Dr. Costigan this question:



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"Did it occur to you that by the administration of medications designed to lower the potassium level, the result may in some way have been to aggravate the digoxin toxicity that may have existed?"

"A. Yes."

Do you see that?

A. Yes, I see it.

Q. Well, I suggest that to you as a hypothesis that it is at least hypothetically conceivable that the administration of these medications aggravated the digoxin toxicity that existed. That is, made lethal what was there.

A. My comment to that would be that it is true that an abnormally low potassium level will predispose an individual to toxicity from a smaller amount of digoxin.

I am not sure I would agree that reducing an abnormally elevated potassium concentration to a normal concentration would increase toxicity.

Q. Well, Dr. Costigan was the cardiologist treating the child.

A. Right.

Q. I can tell you that. And he



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said that it occurred to him that the results of his medications might be to aggravate the digoxin toxicity. So we have his assumption --

THE COMMISSIONER: It was a concern of his.

THE WITNESS: I agree that it occurred to him.

MR. SCOTT: Q. All right.

A. I mean I can't comment on that. That is his testimony and I don't --

Q. He was the Chief Resident and the cardiologist looking after this baby at the time.

Now what I am suggesting to you is that --

MR. OLAH: I think in all fairness, Dr. Costigan, I think it was in retrospect also.

THE COMMISSIONER: Oh, yes. I don't have any trouble with that. I think the situation was that he was concerned, and I think this was post mortem, that all that he had been doing to try to relieve the potassium count might in fact have resulted in --

MR. SCOTT: I agree. I agree.

THE COMMISSIONER: -- in something --



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MR. SCOTT: I agree.

Q. What I am saying, bearing in mind that this child was on digoxin therapy, is it conceivable that these ministrations, well intentioned and no doubt quite proper, may have made legitimately administered digoxin lethal in the case of Baby Pacsai?

A. I think if they were effective enough to lower his potassium to very low, abnormally low concentrations, that is a possibility, yes, I think it is conceivable under those circumstances.

We don't have any evidence that that occurred, but if indeed it would have, it could have increased the susceptibility to digoxin toxic effects.

Q. I take it that it follows on that hypothesis that the digoxin already present might have killed the child --

A. Well --

Q. -- without any illicit administrations?



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A. Well, I don't know if I would go that far, it depends on how much was there.

Q It depends on a whole lot of assumptions, doesn't it, just like every other theory.

A. There are a lot of children with normal amounts of digoxin in their body who have some degree of hypokalemia who do not die from digoxin poisoning. In fact, that is probably the usual rather than the exception.

Q Well now, one other problem in your evidence before the Murphy inquest, you said at page 13, and let me just read it to you. It is perhaps now conventional wisdom for us in this Inquiry:

"A. I have to respond to that by saying that the symptomatic signs of digoxin toxicity in infants are rather non-specific and usually are symptoms that can be due to other factors. And it is difficult in many situations in a clinical situation to be certain whether or not a specific symptom is due to or not due to digoxin in a child and this is where levels come in handy sometimes to help you sort that out. Vomiting, it is true that



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"vomiting, loss of appetite, irritability
can be symptoms associated with toxic
digoxin effects. They can also be
associated with a myriad of other
things in infants this age and that's
why it is so difficult to make a
definite association."

Now, I take it you remember giving that
evidence?

A. Yes, I do.

Q. And you accept it today as
you accepted it then?

A. I think I still agree with
myself, yes.

Q. Yes. As time passes we may
all change our minds to these complicated questions,
Doctor, but for the moment nothing has changed in
the literature that leads you to qualify that?

A. With that piece of my evidence
I think I still agree.

Q. Right, yes. I take it that
seizures are not indicators of digoxin toxicity?

A. Well, they have been
associated with severe digoxin toxicity, yes.

Q. But they are not explicit?



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A. They are not proof of digoxin toxicity, no.

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Q. Now, you see, one of the other problems we have in this case is, Dr. Fowler, who is a cardiologist, gave evidence and put forward a paper that he had prepared - it is Exhibit 174 - in which he reported dealing with some other babies, a sample of 31 babies in the Hospital, that seizures were noted in only 1 out of 31 cases. That was 3 per cent. He also gave evidence here that he had reviewed the literature and the literature showed seizures in 1 out of 16 cases, or 6 per cent. I take it those sorts of figures ---

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MR. HUNT: Well, if my friend is about to ask the witness about that evidence or that paper then the witness should have that paper.

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MR. SCOTT: I am not about to ask him about that, I am simply reciting that evidence.

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MR. HUNT: Well then, the witness -- well, I will wait for my friend to answer the question.

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THE COMMISSIONER: Wait until you hear what the question is.

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MR. SCOTT: Q. Well, Dr. Bain told the Commissioner that 16 of the 36 babies with which we are here concerned showed seizure activity of



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various levels of intensity and one example that he gave was the Miller child at page 42 of the chart, was noted to become very rigid and extended legs and arms.

Now, first of all, is the level of seizure activity that Dr. Bain noted, in your opinion, an unusually high level?

A. I would need to look at his testimony and see the context in which he made those statements and look at them and then I would try to respond to you.

Q. All right. Well, perhaps we can get you a note of the page of his testimony and as you are going to be here tomorrow you can look at it at the end of the day.

A. I have no disagreement on the face of it. He said the seizure incidence was what?

Q. No, he noted, he did a chart review just like you did.

A. Yes.

Q. He didn't treat any of these babies but he did a chart review of all 36 and he noted seizure activity with respect to 16, that is, half, almost half.

MR. ORTVED: I think it was more than 36.



GG.5

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MR. SCOTT: Was it?

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MR. ORTVED: 44 deaths.

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MR. SCOTT: Q I am sorry, 16 of our 36.

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He looked at more deaths that were outside our 36

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and he found one or two seizures in those, but of our

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36 he found 16 that exhibited seizures. First of all,

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I ask you, is that, according to your understanding

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of the literature, a very high proportion, or is it

not or do you have any opinion on that?

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A. Proportion in infants this age

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with severe heart disease?

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Q. Yes.

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A. Or proportion of ---

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Q. You see ---

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A. You see, I'm not sure what

population you're having me compare them to.

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Q. We are talking of young

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cardiac babies. You see, Dr. Fowler's review, it is

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true you haven't seen it and I can't ask you to

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comment on it but he gave his review of the literature

and produced a figure, don't worry about that.

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Dr. Bain gave an analysis of the seizures he found in

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our 36 and what I am really asking you is, have you

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anything to say or is that a matter for cardiologists

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as to whether that is an inordinately high proportion?

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A. Well, if you are talking about a group of small infants who were admitted to a tertiary hospital with severe heart disease, I'm not sure that's a high incidence; if you are comparing them to a general population of infants and children I think it would be a high incidence. I'm not sure what denominator you are asking me to use?

THE COMMISSIONER: Can I try to help out here. I think that the position that is being taken, let me put it this way, by some doctors, if these children all died of digoxin poisoning, would this not be a symptom of digoxin poisoning, not normally be, it is odd that so many of them suffered from seizures. That is what they are saying and have you any comments on that?

THE WITNESS: Well, I'm not sure I can follow that assumption because seizures are due to so many causes in infants this age that they may have had by chance other conditions that caused seizures. I mean, the fact of the incidence of seizures was different from some other sample from another population I don't think really tells me one way or the other whether they may have been related to digoxin.

MR. SCOTT: Q. Well, the first



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question I should ask is, is this a question for a pharmacologist or is it a question for a cardiologist or a pathologist? Am I asking the right person?

A. I think it is an appropriate question for a paediatrician, of which I am one.

Q. All right. Well then, you are entitled to answer. The Commissioner has put the problem to you. Is there something else going on here that we don't know about, bearing in mind that seizures not usually indicative of digoxin toxicity occurred in 16 out of 36 cases?

A. Well, there were a lot of other things going on with these kids other than digoxin.

Q. Well, is there anything going on connected with that that may have led to their deaths?

A. I don't know. If I follow you, I don't think I can answer that, I mean, if I understand the point of your question, the meaning of your question. I'm not sure I can answer it, I may have to say I don't know. You see, the seizures, we could use another symptom, we could say vomiting or we could say high respiratory rate, or whatever. There are so many other things that can influence the



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2 incidence of those symptoms other than digoxin and
3 that's why it is difficult to use them as definitive
4 signs of poisoning.

5 So that a change, even if this
6 incidence is high, compared with some other, whatever
7 other comparison population we have, which we haven't
8 defined at this point, whether it is high or lower
9 than some other population, I'm not sure, I don't
10 think it makes any difference to me in terms of
11 trying to say whether or not digoxin was involved
here. It is not terribly helpful to me.

12 Q You see, Doctor, let me put
13 the problem this way. Lawyers like simplistic
14 solutions and I would like one if I can have one but
15 maybe there can't be one. What you have here is, as
16 you know, a number of babies who died exhibiting
17 symptoms that have been described time and time again.
18 Because there are in the case of a number of babies
19 digoxin in their system which should not be there,
20 there is a tendency to holus bolus say, well then,
21 any babies who were in doubt were killed by digoxin.
22 There is a tendency on the part of the cardiologists
23 to say, well, these babies had grossly diseased hearts
24 and they probably died of - you can't say natural
25 causes but you know what I mean, they are cardiac



GG.9

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2 conditions of which there is said to be some 13
3 possibilities.

4 What I am saying to you is, we know
5 one fact, according to Dr. Bain, that 16 out of 36
6 exhibited seizure. Is there a possibility that there
7 is something else going on here or must we maintain
8 these blinkers with only two options or is it too
early to say?

9 MR. HUNT: Dr. Kauffman has said he
10 would like to see the evidence of Dr. Bain with
11 respect to the seizures before he gets into it.

12 MR. SCOTT: Well, I would like to ask
13 him the general question.

14 THE WITNESS: I think I would be
15 willing to answer this and, that is, I don't think
16 the incidence of seizures in these 36 babies is
17 helpful to me in any way in addressing that question
18 in trying to decide whether or not digoxin played a
19 role in any one of them. I don't see the incidence
of seizures in these 36 babies as being helpful to me.

20 MR. SCOTT: Q. Well, no, again, you
21 see, you are saying I don't see the number of seizures
22 as helpful in proving or disproving a digoxin theory.
23 I understand that. What I am saying to you is, is
24 it possible that the incidence of seizure activity
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GG.10

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points to some other possibility about these babies
that we haven't considered?

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A. That's when I said I don't know.

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Q. No. Well, what I am trying to
get you to help me with is, is it possible that there
are other factors that we haven't unearthed? Are we
driven to murder on one side and to natural causes on
the other?

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THE COMMISSIONER: Could we just change
that question a little, please?

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MR. SCOTT: I'm sorry, the word is
offensive but that is what we are talking about.

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THE COMMISSIONER: No, but are we
driven to digoxin intoxication on one side or ---

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MR. SCOTT: Digoxin intoxication on
one side or sick babies dying on the other or is there
another possibility?

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THE WITNESS: Well, I thought the sick
babies on the other hand included all the other
potential possibilities.

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MR. SCOTT: Q. Well, they may well.

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A. I mean, that is kind of a --
anything else that may well have contributed to their
death.

Q. But then I point out to you a



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fact that can be demonstrated, that an uncommonly high number, according to Dr. Fowler and Dr. Bain, exhibit this phenomena. Does that help you at all? If it doesn't, say so.

A. No, it does not.

Q. All right.

MR. YOUNG: Excuse me, Mr. Scott, if you are about to move on to another point perhaps the record should be clear. You have referred to Dr. Costigan as the presiding cardiologist with respect to Baby Pacsai early today.

MR. SCOTT: I'm sorry, he was the chief resident.

MR. YOUNG: You corrected Dr. Kauffman when he said someone else in the Cardiology Department. To be clear, I have examined Dr. Costigan's C.V. and I see no evidence of him having spent any time in the Cardiology Department. He is a very well qualified doctor but not in cardiology.

MR. SCOTT: He is the chief resident, I am sorry.

MR. HUNT: And if my friend would give us the reference to Dr. Bain's evidence that he has referred to we will ask Dr. Kauffman to look at it.

MR. SCOTT: Yes, you will get that



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a little later towards the end of the day.

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MR. HUNT: I appreciate that.

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MR. SCOTT: Q Well now, let's just
carry this business of the seizures one step forward.
In the Miller case we know from page 42 of the chart
that she became very rigid and extended legs and arms.

A. Just a minute, I want to look
at the chart with you. I'm sorry, what page?

MS. CRONK: 42.

MR. SCOTT: 42.

Q So, the Miller child was in
seizure at some point in time.



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A. I am sorry, were you asking me or ---

Q. I am simply noting that she was in seizure at that time, do you agree?

A. She was described as, in fact the word "seizure" is used.

Q. Then she was in seizure, there is no doubt about that?

A. Yes, I think so.

Q. And then at page 5690 and 5691 you are asked this question.

A. Where are you referring to now?

THE COMMISSIONER: Your evidence.

Q. Your evidence where Miss Cronk was examining and I am reading beginning at line 18:

"At 1:45 we see the irregularity in the child's apex and the gagging and the vomiting to which you have referred but it is almost an hour later - well, it is indeed an hour later when it is noted that she began seizure-like activity. When you talk, Doctor, of the onset of the critical symptoms,



Kauffman, cr.ex.
(Scott)

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"do you have one of those two specific
times in mind?

A. Well, I was actually relating
the onset to the increasing bradycardia
and irregular heart rate and the
gagging and vomiting. I think that
could have been the onset of the
symptoms that have progressed to the
other symptoms that followed. There
is a complicating factor and, that
is, because of her rapidly deteriorating
condition the seizures could possibly
be related not to digoxin but to lack
of oxygen or acidosis or other things
that were interfering over that short
period of an hour when she was
rapidly deteriorating."

Now, you recall giving that answer?

A. Yes.

Q. Now do I take that to mean
that the child was rapidly deteriorating?

A. To use your phrase.
That was my impression from
reading the chart during that period of time.

Q. And the seizures were one



1
2 result of that?

3 A. They were part of the symptom
4 complex that was described during that period of
5 time.

6 Q. Are you suggesting that that
7 is about the time when the digoxin was administered,
8 the illicit dose?

9 A. No.

10 Q. When was the illicit dose in
11 your opinion?

12 A. I think if it was administered
13 it was, it preceded the onset of these other
14 symptoms that I alluded to in the testimony that
15 you just read me.

16 Q. Well, when? Well you see
17 what I am getting at, if the seizures are not
18 manifestations of digoxin toxicity.

19 A. I didn't say that. She did not
20 have all these symptoms in one moment of time, she
21 had a series of symptoms resulting that you might
22 anticipate if she ---

23 Q. Now I understood you to
24 say ---

25 A. Because of her cardiac
condition deteriorating.



Kauffman, cr.ex.
(Scott)

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Q. Now I understood you to say that seizures were not an indication of digoxin toxicity?

A. They may or may not be. I didn't say they never were, I said they may or may not be.

Q. So they are neutral?

A. They may be caused by digoxin; they may be caused by anything.

Q. I see.

A. In fact in this child this seizure may have been due to the acidosis and the hypoxia which was produced by the arrhythmia due to a toxic dose of digoxin. In that situation you might say that the seizure was not directly related, not directly caused by the digoxin but indirectly the course of events that were set in motion by a digoxin toxic dose that could have resulted in seizures.

Q. Well what I am suggesting to you is that the child; that it is consistent with the child's cardiological history to be at this stage in a rapidly deteriorating condition, exhibiting inter alia a seizure, that is consistent with her cardiological symptoms.



Kauffman, cr.ex.

(Scott)

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A. With the acute symptoms at

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this time?

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Q. Yes.

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A. Yes.

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Q. Isn't that so?

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A. The seizure is consistent with

her cardiac problem at that point in time, yes.

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Q. Then I take it that what you

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are suggesting is that the rapidly deteriorating

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condition of the baby and the seizure, occurred,

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would have occurred, or might have occurred whether

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the digoxin was administered an hour before or not,
is that fair?

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A. Did I say that?

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Q. No, but is that fair, I am

15

asking you.

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A. Well, if there was another

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cause for her to suddenly change and develop these,

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this course of symptoms that is a possibility, yes.

19

Q. No, I think you have agreed,

20

Doctor, that her rapidly deteriorating condition

21

and her seizure which led to her death was a result

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of her - might be a result of her cardiological
condition absent digoxin?

23

A. I agree her seizure very well

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Kauffman, cr.ex.
(Scott)

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2 may have been the result of complications of her
3 cardiac arrest and hypoxia and acidosis as a result
4 of poor cardiac output during that period of time.

5 Q. Then why do you necessarily
6 have to insert digoxin in an illicit dose in her
7 case to justify her death?

8 A. Let me go back and go through
9 it again and maybe I can be of some help, if I can
10 find my papers. We are talking about Miller, right?

11 Q. Yes.

12 A. Okay. Her underlying - I have
13 got to refresh my memory on some of the details here
14 so I can answer this for you as completely as
15 possible.

16 Q. You see - I don't want to
17 stop you, but when you say at page 5691:

18 "There is a complicating factor and
19 that is because of her rapidly
20 deteriorating condition the seizures
21 could possibly be related not to
22 digoxin but to lack of oxygen or
23 acidosis or other things that were
24 intervening over that short period of
25 an hour when she was rapidly
deteriorating."



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2 What I am asking you is, is there
3 a hypothesis upon which her death can be explained
4 without the intervention of an illicit dose of
5 digoxin?

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6 A. I think so. I think that there
are several hypotheses and we considered them all.

7
8 Q. That is all I want to get out
9 of it. But a digoxin dose is not necessary to
10 explain the circumstances in which this poor baby
died.

11 A. She could have had a sudden
12 death due to her underlying heart disease that could
13 have had symptoms not unlike those which were
described.

14 Q. Now one other thing that
15 causes me trouble is - I understand from the
16 evidence that we would expect to find ethyl
17 alcohol in babies because dig. is about 10 per cent
18 alcohol, is that right?

19 A. I think the propanolol
20 preparation is about 10 per cent ethyl alcohol in
it, yes.

21 Q. Now at page 1 of Exhibit
22 95-1, and I don't think it is necessary to go
23 through it unless you want to; Mr. Cimbura notes
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that methyl alcohol was found in the tissues of
Cook and Pacsai.

A. Where is this?

Q. It is Exhibit 95.

A. In his report?

Q. I think that is his report.

THE COMMISSIONER: It is not page 1,
it must be some other page, is it not, 95A is it?

MR. SCOTT: It is D, I am sorry.

MR. OLAN: Exhibit 95D, Mr.
Commissioner, capital D for Donald.

Q. I can show you this.

A. Yes, it would save me.

Q. It is just a note at the
bottom, do you see it?

A. No.

Q. Now, methyl alcohol is a
poison, isn't it?

A. Yes, it is.

Q. And it is highly poisonous.
How can we account for its presence in the samples
of Cook and I think Pacsai?

A. I really can't be helpful with
that, I don't know, I would have to, you would have
to ask the individual or whoever ran the samples.
I notice that he made a statement that he thought



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these were artefacts. I don't have any knowledge
with which I can be helpful to you on that.

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Q. What does an artefact mean to
you, what does that word mean, that it is an artefact.

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A. It is usually something which
appears to be present and actually isn't, or it is
actually present but it was caused by some manipulation
we did in the process of measuring it.

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Q. I see. Now I know you were
asked about these yesterday and I have to pursue it
even at the risk of offending momentarily the
Commissioner.

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I take it in dealing with this
difficult problem, Doctor, you were anxious to
try and examine these deaths as it were in
isolation one from the other.

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A. I am not sure what you mean.

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Q. Let me tell you; one of the
problems, I shouldn't say one of the problems, one
of the facts of this case is that it is made up of
medical testimony and explanations for deaths; and
it is also made up of a statistical analysis, the
elevated levels, the elevated levels dropping off,
do you follow me?

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A. Are you talking about Pacsai?

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Q. All 36.

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A. The whole picture?

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Q. Yes, the whole picture is

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part medical analysis; but in the background of the

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medical analysis is a profile of deaths in the

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Hospital that has been described?

8

A. Yes.

9

Q. And I take it to be self-

10

evident that if the only baby to die in six months

11

was Pacsai we would not perhaps have a case of the

12

type we have now, it is the profile that tends to

13

inform the medical examination. Do you see something

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of that in this case?

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A. If I understand your question

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correctly I think that, yes, the facts that babies

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were dying at a higher rate than they were expected

18

caused somebody, or somebody in the Hospital to

19

say, hey, what's going on, let's start looking.

20

Q. So it is the fact that babies

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died in the period, does that have any significance

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for you in assessing the cause of their death?

23

A. Only to the extent that in

24

determining the babies I was asked to review their

25

charts.

Q. All right. Now, I am going



1
2 to ask you, Gary Murphy died and you have defined
3 the categories 5 through 1. I am going to ask you
4 to assume that Gary Murphy died on March 18th of
5 the epidemic period. I am going to ask you to look
6 at your definition, and I wonder where you would put
7 Gary Murphy and why.

8 MS. CRONK: I am trying to remember,
9 sir, whether Mr. Scott or it was Messrs. Scott and
10 Hunt who objected to that question yesterday.

11 THE COMMISSIONER: I think you are
12 quite right.

13 MR. HUNT: Mr. Scott wasn't here so
14 it was me.

15 THE COMMISSIONER: Poor Miss Cronk she
16 tried that question and then withdrew it. I thought
17 it was because it irritated you but it might have been
18 Mr. Roland.

19 MS. CRONK: No because the witness
20 said he didn't know where he would place the child.

21 THE COMMISSIONER: No, I thought, and
22 maybe that was some other place. Let's try it any-
23 way, we will now get to it, where would you have
24 put Murphy, back in, what if he had died; but I take
25 it your assumption is that he is doing it at the same
time as he is doing the other babies?



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MR. SCOTT: Q. Yes. On the assumption you were doing it at the same time as you were making the other analysis, and on the assumption that the baby died within the epidemic period.

MR. HUNT: Mr. Commissioner, I think nothing has changed between yesterday and today inasmuch as the witness was told yesterday that he didn't have to answer a question such as that because it really wasn't going to assist us, but if he wanted to he could. Yesterday he said he didn't know how he would answer it, and today he surely doesn't have to.

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THE COMMISSIONER: You see there you are. There is a fellow with a good memory and he has got me down to rights.

MS. CRONK: Now that I have woken up.

THE COMMISSIONER: I did say yesterday --

MR. SCOTT: Look, we have all changed our minds, including the doctor, about the Baby Estrella so I am sure your lordship --

THE COMMISSIONER: They used to say about judges when they do that sort of thing but I think I will still say to him that he needn't answer because the important thing to us is not what he would have done but what he now thinks in the state of his intellect, but I don't think I forbade him from answering that yesterday, and if you want to answer it you are entitled to do it.

Yes, Mr. Olah?

MR. OLAH: He did in fact answer yesterday.

MS. CRONK: He did answer it.

THE COMMISSIONER: Well you see maybe today he will be able to do even better.

MR. SCOTT: One of the difficulties with this case is our analysis of it is formed by the



1
II2 2 death profile in the Hospital, and that is a fact of
3 life with which we must come to terms. But everybody
4 who has examined this case from the Chief Cardiologist
5 down has said if Cook is -- if Cook gets an illicit
6 overdose of digoxin then maybe eight or ten or twelve
7 of the babies before Cook -- if there is a person
8 in the Hospital who would do that then maybe other
babies are high risk babies.

9 Now I just want to put Murphy into
10 that context.

11 Q. If Murphy had died before
12 Cook where would we have put Cook on our ratings list?
13 Are you able to help us, doctor?

14 A. If Murphy would have died
15 before Cook?

16 THE COMMISSIONER: Well let's say
a couple of days before.

17 MR. SCOTT: Q. If Murphy had died
18 the same day as Miller, Baby Miller, when you were
19 asked to examine ten, you would have been asked to
20 examine eleven including Baby Murphy.

21 Are you with me so far?

22 A. You are talking about before
Cook?

23 Q. Yes, sir.

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II3 2 A. I thought you said if Murphy
3 died --

4 Q. If the Crown Attorney asked you
5 to examine ten babies, one of them was Cook, and nine
6 were babies who had died before Cook in terms of time,
7 and he asked you --

8 THE COMMISSIONER: Oh, just a moment.

9 MS. CRONK: Sir, this is just not
10 right. He was asked to review all the
11 cases of the period --

12 MR. SCOTT: It doesn't make any
13 difference.

14 MS. CRONK: Well, put it correctly,
15 Mr. Scott, or I wouldn't be on my feet.

16 MR. SCOTT: All right.

17 Q. Will you tell us again - Miss
18 Cronk wants to hear it - will you tell us again
19 precisely what you were asked to do.

20 A. By?

21 Q. By the Crown Attorney.

22 A. The Crown Attorney asked me
23 to review some 30 odd cases to assist them in whether
24 or not --

25 Q. You were to provide an
opinion?



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II4 2 A. I was to provide an opinion as
3 to whether or not digoxin might have played a role
4 in the deaths of any of those babies.

5 Q. Yes.

6 A. From a pharmacologic point of
7 view.

8 Q. All right. And what did CDC
9 ask you to do?

10 A. They asked me to look at 37
11 cases.

12 Q. Yes.

13 A. And they asked me to put a
14 numerical rating of probability on those cases as to
15 the probability that their deaths might have been
16 related to digoxin.

17 Q. All right. And the 36 cases
18 that were referred to you by the Crown Attorney or the
19 37 referred to you by the CDC all ended chronological-
20 ly with the death of Baby Cook.

21 Baby Cook was the last of the
22 sequence to die.

23 A. I don't remember. If that is
24 factual, I will accept that.

25 Q. All right. Now what I am asking
is that if the Crown Attorney and CDC had added the



Kauffman
cr.ex. (Scott)

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II5 2 name to your list of a baby who died before Cook died,
3 who exhibited all the characteristics of the death
4 of Baby Murphy, how would you have ranked that death?

5 Are you with me?

6 A. I think so.

7 MR. HUNT: That is only if the
8 witness wants to answer.

9 MR. SCOTT: Sure. I am not going to
10 extract an answer that he doesn't want to give. He
11 is a professional. If he doesn't want to give it, he
12 won't.

13 MR. OLAH: He answered yesterday,
14 Mr. Commissioner. The answer is at 5827.

15 THE COMMISSIONER: Do you want to
16 see what you said yesterday?

17 THE WITNESS: I was just going to
18 say --

19 MR. SCOTT: Q. Well, if you have
20 answered it, I don't want to ask you to answer it
21 again.

22 A. I will give the same answer
23 that I gave yesterday, and very honestly, considering
24 all that has happened in the intervening time I don't
25 know how I would have ranked it at that point in time.

Q. Is that the answer?



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MR. OLAH: That is the answer.

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MR. SCOTT: Q. Let me put this to you, doctor: I want you to take overnight and I want you to answer that question if you can.

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When you were given this task by CDC, you were given the charts or some other material. You were allowed to select your own ranking system, which I think you did.

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A. Yes, that is correct. I --

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Q. Then --

A. I didn't design the form but I did define the criteria.

Q. And then you after looking at the charts for whatever length of time you felt was desirable or necessary, you graded the babies and I take it that there is nothing perfect about that grading. It was a human exercise in which you applied your best talent to doing it?

A. That is correct.

Q. And why can't you do the same for the Murphy record?

A. I can do it today. I can't assure you that what I would do today or tonight will be the same as what I would have done a year ago because of all that has happened in this whole



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II7 2 situation since then.

3 THE COMMISSIONER: Wait a minute,
4 doctor.

5 Yes, Ms. Jackman?

6 MS. JACKMAN: Mr. Commissioner,
7 perhaps Mr. Scott could be a bit clearer about what
8 he is asking. I understood the question put to the
9 doctor yesterday was with respect to his rating on
10 the police report and not the Centers for Disease
Control. He does have a ranking --

11 THE COMMISSIONER: No, I thought it
12 was --

13 MS. JACKMAN: -- a ranking system
14 with respect to the CDC.

15 THE COMMISSIONER: I thought it was
16 with respect to the -- I don't think the question has
17 been put --

18 MR. SCOTT: And it is not going to
19 be. That isn't what I would like him to do.

20 THE COMMISSIONER: You would like him
21 to what?

22 MR. SCOTT: I would like him to do
23 what he and I understand.

24 Q. I take it, doctor, you are
25 saying that you don't think you can do that?



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A. I can sit down and I can go through the Murphy chart with all my other information just as I did a year ago.

Q. Yes.

A. And I can put a rating on it.

THE COMMISSIONER: No, be careful. It was last April, wasn't it?

THE WITNESS: No, it was in November of 1982 that I did the CDC ratings.

THE COMMISSIONER: Yes, yes. But the Murphy child wasn't until later.

THE WITNESS: Yes, that is correct.

THE COMMISSIONER: You mean just the way you did --

THE WITNESS: Just the way I did with the others.

I can do that tonight. All I said was I can't assure you that that will reflect what I would have done a year ago had he been a part of that original set of cases, as you suggest.

MR. SCOTT: Q. Are you telling me that if you had done this as part of the original set of cases you might have given Murphy a rating which is different than the rating you would give him if you sat down and did it tonight?



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A. No, that isn't what I said.

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Q. Oh, what did you say?

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A. I said I can do it tonight but

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I can't assure you that I will behave in the same way
as I would have a year ago knowing what I knew then
and knowing and having been through what I have been
through now.

8

Q. Let me ask you this, doctor.

9

If you sat down tonight to apply your ratings to
Cook, Lombardo, Pacsai, Inwood, Miller, Belanger,
Hines, Gage, Estrella and Gionas, would you come up
with anything different than you came up with a year
ago?

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A. No. I haven't sat down -- I

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haven't gone through that exercise.

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Q. No, but you can do that too.

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MR. HUNT: Well, Mr. Scott is being

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very free with the witness' time.

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MR. SCOTT: Well, I'm sorry about

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that.

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MR. HUNT: You may be sorry, but just

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so that the witness realizes that Mr. Scott can ask
for these things - he may even put it in a sort of

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demanding way, but the witness is under no obligation

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to spend any time this evening pursuing these

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II10 2 exercises for Mr. Scott's purposes if he doesn't
3 choose to or if he doesn't feel they are helpful.

4 THE COMMISSIONER: Well one of the
5 troubles with those exercises -- what all of our
6 examination and cross-examination has been directed
7 to I think is really what is his view now and the
8 purposes of all of these other things, the Atlanta
9 Report and the report to the Crown Attorney are really
10 only for purposes of cross-examination.

11 What we really want from you, and
12 I think you understand this, I hope you understand
13 it, we want your present opinion, and you may refer
14 to your previous one and counsel will certainly refer
15 to your previous one if your present opinion is
16 different from what it was then, but we really want
17 to ask you your present opinion, and that is why
18 really, basically that is why I told him he didn't
19 have to answer it.

20 I think Mr. Hunt is right. He didn't
21 have to go through that sort of exercise to say what
22 he would have done with those --

23 MR. SCOTT: No, Mr. Commissioner. The
24 point I am directing --

25 THE COMMISSIONER: You are asking --

MR. SCOTT: -- is different. The



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Atlanta Report is not simply an aid to cross-examination. The Atlanta Report when it is released is going to be a major factor in this Inquiry and we are entitled to know how it is made up.

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Now one of the things that was done by a whole lot of doctors, including this one, was to scale the deaths in a fashion like this, and they did it against a given background, the epidemic period.

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THE COMMISSIONER: That is right.

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MR. SCOTT: Now if there was no epidemic period and they were just scaling the deaths, I have no problem.

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I want to know to what extent if any the fact that a baby died in the epidemic period may have been significant in the rating it got, and that is an important question, and that is why I say to the doctor that if there are changes in the ratings I would like to know about them.

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MR. YOUNG: Mr. Commissioner, I thought the witness answered--

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MR. SCOTT: It seems to be a thing that is unpopularity recieved by my colleagues and I won't press it.

23

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MR. YOUNG: It is not unpopular, it



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II12 2 is just that I am not sure how useful it would be.
3 I thought the witness was asked what effect the
4 very fact that these children died within that
5 period had upon him, and I think the only answer he
6 gave - correct me if I am wrong - was that that was
7 the determining factor as to which charts he would
8 examine, and that was it.

9 Mr. Commissioner, I don't think it
10 serves any purpose for the witness to conduct this
11 entire exercise again this evening, tomorrow evening,
12 this weekend or whenever. If Mr. Scott has a new
13 fact to put to him, I invite him to do so.

14 MR. SCOTT: Well, I am not going
15 to pursue it. I am not going to compel anybody even if
16 I had the power to ask any questions. I simply put
17 this proposition that there can be no doubt in my
18 mind - I may be wrong - that if Baby Murphy had
19 died on March 18th, Baby Murphy would be subject to
20 examination here and would be getting the same kind
21 of treatment.

22 Baby Murphy died outside the epidemic
23 period and the Attorney General and my friends don't
24 want to look into the case.

25 MS. CRONK: Well, it is late and --

MR. SCOTT: Because it doesn't fit



1
II13 2 the pattern.

3 MS. CRONK: It has been a very long
4 week. If we are now starting legal arugment --

5 MR. SCOTT: No, no, no. I won't
6 press it.

7 THE COMMISSIONER: If it is any
8 help, Mr. Scott, I don't see any way that I can fail
9 to look into the case because obviously the circum-
10 stances of digoxin levels of Murphy were very similar
11 to digoxin levels of Pacsai, so if I am to make
12 contrary findings on the two of them I obviously
13 have to compare them.

14 MR. SCOTT: Well then is my
15 question useful? I don't want to ask the doctor to do
16 something he is unhappy to do. I don't want to
17 interfere with his spare time.

18 THE COMMISSIONER: What would be most
19 useful and has been asked I think something like
20 twelve times - not by you but other people - to
21 Dr. Kauffman is how if you say that Pacsai died of
22 digoxin toxicity, how could you give all this evidence
23 to the Coroner to the effect that Murphy died a
24 natural death. That's the question and that is the
25 one he has addressed himself to and that is the answer
he has given.



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II14 2 Now as far as the other is con-
3 cerned, I am going to -- you are always accusing me
4 of not making a ruling --

5 MR. SCOTT: Now I am going to get
6 one, am I?

7 THE COMMISSIONER: You are going to
8 get one. I am not going to require him to do this
9 tonight. For all I know he may have a date at the
10 theatre.

11 MR. SCOTT: I hope he has met some
12 nice people in Toronto.

13 THE COMMISSIONER: If he wants to
14 do it, if he wants to give some thought to that and
15 wants to answer it, he may, but there is certainly
16 no requirement that you are to do that.

17 What I want from you is if you have
18 changed your views with respect to any of these,
19 and I think you have already answered that, but if
20 you have changed your view with respect to anything
21 that you did in the past, please let us know.

22 THE WITNESS: I think my testimony
23 has reflected that there has been no substantive
24 change in my view of the cases during the past year.

25 THE COMMISSIONER: You have heard
Mr. Scott; he wants to know what you would have done



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III15 2 with Murphy or what you would do with Murphy now or
3 what you would have done then. If you want to answer
4 those questions --

5 THE WITNESS: I can't answer that
6 now. I would need to sit down and go through the
7 same process again to answer that question.

8 THE COMMISSIONER: You are not
9 required to do it.

10 How much longer do you think you
11 will be?

12 MR. SCOTT: Those are all the
13 questions I have, Mr. Commissioner.

14 THE COMMISSIONER: All right.
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J-1

1 MR. HUNT: Just for the record: that my
2 silence is not taken as agreement with my friend's
3 comments about the Attorney-General not wishing the
4 matter of Gary Murphy to be looked into and I just
5 failed to respond to it.

6 THE COMMISSIONER: His name seems
7 to be bandied about at this Hearing. It is not the
8 first time I have heard Gary Murphy's name.

9 Yes, Mr. Olah?

10 MR. OLAH: Mr. Commissioner, I
11 was assisted by my friends who were going to allow me
12 to go out of rotation and proceed next. Unfortunately
13 I am not available tomorrow morning, so, may I
14 resume my normal rotation and expect to cross-
15 examine tomorrow afternoon?

16 THE COMMISSIONER: Yes. I wish I
17 could promise that that will be what will happen.
18 You may not be reached at all.

19 MR. OLAH: It is obvious the
20 Doctor is going to have to either remain late tomorrow
21 afternoon or come back.

22 THE COMMISSIONER: We will take a
23 poll - another one for what use it is. Mr. Ortved?

24 MR. ORTVED: A half an hour, Mr.
25 Commissioner.

THE COMMISSIONER: A half an hour.

MS. SYMES: An hour and a half,



J-2

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2 Mr. Commissioner.

3 THE COMMISSIONER: Well, there is
4 two hours gone and in the ordinary course that is the
5 morning.

6 How long will you be Miss Jackman?

7 MS. JACKMAN: Possibly an hour.

8 Mr. Commissioner, I would like to say I also have the
9 same problem with tomorrow morning, I don't think I
10 can be here until 10:30, 11.

11 THE COMMISSIONER: Well, you won't
12 be reached before 10:30 or 11, so, you needn't worry
13 about that. I shouldn't make those promises, who
14 knows, lightning might strike both Mr. Ortved and
15 Miss Symes; not that I would wish them any bad luck
16 but it would certainly enable us to get through it
17 faster.

18 MR. OLAH: We have always got Mr.
19 Labow and all the other parents' counsel.

20 THE COMMISSIONER: Have you any
21 thoughts, Mr. Labow, how long you will be?

22 MR. LABOW: I expect to be about
23 a half an hour, Mr. Commissioner, and Mr. Shinehoft
24 expects to be between a half an hour and an hour.

25 MR. TOBIAS: You are looking at
me, Mr. Commissioner and I would think about 15 minutes.



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THE COMMISSIONER: Well, I don't know. I just really want assistance. Is it really worthwhile trying to come early tomorrow morning? Well, I can cut her off, she is on the payroll.

MR. ORTVED: Well, it hasn't proved too helpful.

THE COMMISSIONER: Well, I can get up and leave.

MR. HUNT: You have me again as well, Mr. Commissioner.

THE COMMISSIONER: Yes, I know but we didn't have you the first time, so, you didn't take too much time.

MR. HUNT: Well, the Doctor hasn't been confused on any issue but I have been confused on a couple of them.

THE COMMISSIONER: I see. Well, let's try it at 9:30 because it certainly won't hurt to get through as much as we can. I take it, Mr. Ortved, are you available at 9:30?

MR. ORTVED: Yes I am Sir. I should just say that they are threatening to call me down in the Supreme Court and if in fact that happens I may not get up here until later in the day but I am confident I can be here tomorrow and if I'm not here then maybe Miss Symes can take over.



J-4

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THE COMMISSIONER: Miss Symes, will you be here at 9:30 in case?

MS. SYMES: I will be here at 9:30.

THE COMMISSIONER: Yes. All right. Well then we will have ---

MR. TOBIAS: I hate to make this a meeting of musical chairs, Mr. Commissioner, but I have a problem tomorrow morning too as well as Mr. Olah, Miss Jackman and Mr. Ortved but I can't be here until ---

MS. SYMES: I can give you an undertaking I will go so long.

THE COMMISSIONER: No, no. That is the sort of undertaking I don't want from you. Mr. Labow, are you going to be here tomorrow morning?

MR. LABOW: I will definitely be here tomorrow morning.

THE COMMISSIONER: All right. Well then we have got two designated hitters ready to go and that will solve that problem. We will start at 9:30 tomorrow morning then.

--- whereupon the hearing adjourned at 5:05pm. to be reconvened at 9:30 on Friday, December 2nd, 1983.

